
System
of the
CREATION
of our
Globe, Planets & Sun.

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Hon. Chief Justice Meredith,
Quebec,

AN ATTEMPT

TO

FORM A SYSTEM

OF THE

CREATION OF OUR GLOBE,

OF THE

PLANETS,

AND THE

SUN OF OUR SYSTEM;

FOUNDED ON THE FIRST CHAPTER OF GENESIS, ON THE GEOLOGY OF THE EARTH, AND ON THE MODERN DISCOVERIES IN THAT SCIENCE, AND THE KNOWN OPERATIONS OF THE LAWS OF NATURE,

As evinced by the discoveries of

LAVOISIER AND OTHERS IN PNEUMATIC CHEMISTRY.

Second Edition, Revised and Enlarged.

By HENRY TAYLOR.

QUEBEC:
PRINTED BY W. COWAN & SON.
1840.

PREFACE

TO THE FIRST EDITION.

In my endeavours to reconcile the present Geological appearances of our Earth, with the Mosaic account of Creation, the only certain means that appeared to me, were, the adoption of that construction of the first verse of Genesis, which I have stated in a part of this Work, and it will be seen by an extract from the Quarterly Review of April last, inserted below, that this construction has been confirmed and sanctioned by the writings of Professor Buckland, Doctors Pusey and Chalmers, Bishop Gleig, and other eminent Divines. These authorities have removed the diffidence I had long felt to publish a different construction from what has, hitherto, prevailed.

The original manuscript of this work was composed between the years 1819 and 1825. The writings of the above reverend gentlemen were published, I believe, several years afterw ards and none of them had been perused by me, until a few days, since, when I met with the Review of the Bridgewater Treatise of Doctor Buckland.

In the summer of 1829, I presented a prospectus of the work to Archdeacon Mountain, and to the Bishop of Quebec. The former kindly complimented me on it, and the latter recommended my publishing it in London, for which I was soon to embark. I arrived there in October of same year, and presented the prospectus to the Lord Bishop of London, from whom I received a note by which he was pleased to commend the design of the work. I subsequently presented the prospectus to several of the principal Booksellers, who, on learning that the size of the work would be that of a pamphlet, informed me, that the cost of advertising was so great, that no pamphlet would pay it, and my circumstances preventing me from incurring that expense, I gave up the intention of publishing.

In the mean time, a reverend gentleman of the name of Fairholme was publishing a theological work connected with geology, and I enclosed to him a copy of the prospectus, and in a letter I received from him, dated Oct. 14, 1833, he says

"With regard to the Creation of our earth or of the sun, and other members of the Solar System, I have neither found in the work of any writer, nor can I conceive the smallest grounds on which to form a consistent theory, nor indeed do I conceive that it belongs to the science of geology at all.* Scripture has given us no insight into it. The existing laws of nature are equally silent, *and yet, these laws must have existed from the beginning.*" He then assumes, "that the granite mass has been formed before the existence of organized beings, as their remains are never found in it," an opinion which, I think, the reader will find answered in note 2nd of this work; and the assertion, that neither scripture nor the laws of nature give any insight into the Creation, appeared to me so futile, that I have inserted the above extract, solely to prove, that the system I had formed, had not, at the date of that letter, been *yet* made by any other writer.

By the following extract from the Bridgewater Treatise of the Rev. Doctor Buckland, published long since the date of Mr. Fairholme's letter, it will be seen, *that* my construction of the 1st verse of Genesis, has been sanctioned and confirmed by the authorities mentioned above.

And having presented my prospectus to the persons above named, and also to the Royal Institution in Albemarle-street, London, in 1833, I consider it a duty to myself to claim the originating of that construction, by which the general appearance of *gradual deposition* in the geology of the earth, (whose diameter must, according to the modern geologists, have existed millions of years) will, as well as this supposed age, be now reconciled, and satisfactorily explained by the Mosaic account.

Extract from the Review of the Bridgewater Treatise.

"If there are any lovers of science yet ignorant of the extent and fertility of the field which Geology has laid open—of the intensity and variety of interest by which those who explore it are repaid—here is a work to astonish and delight them. If there are any persons yet deterred from the study of this fascinating science, by the once prevalent notion, that the facts, or theories if you will, that it teaches, tend to weaken the belief in revealed religion, by their apparent inconsistency with the scriptural globe,—*here*, in the work of a dignitary of the church, writing, *ex cathedra*, from the head quar-

* In this he was right, it belongs to the science of Cosmogony.

ters of orthodoxy, they will find the amplest assurances that their impression is not merely erroneous, but the very reverse of the truth: for that, while its discoveries are not in any degree, at variance with the correct interpretation of the Mosaic narrative, there exists no science which can produce more powerful evidence in support of natural religion—none which will be found a more potent auxiliary to revelation, by exalting our conviction, of the power, and wisdom and goodness of the Creator.

"Several hypotheses have been proposed, with a view of reconciling the phenomena of geology, with the brief account of creation which we find in the Book of Genesis and others. It has been plausibly stated, that the Six Days of Creation must, each of them, be understood to imply, not as now, a single revolution of the Globe, but some other cyclic period of unknown extent. Dr. Buckland, however, prefers that explanation which is supported by the high authority of Dr. Pusey, the Regius Professor of Hebrew in Oxford, and has the sanction of Dr. Chalmers, Bishop Gleig, and other eminent contemporary divines,—namely, that the phrase employed in the first verse of Genesis, "*In the beginning* God created the Heaven and the Earth,' may refer to an epoch antecedent to the 'first day,' subsequently spoken of in the fifth verse, and that, during this indefinite interval, comprising perhaps, millions and millions of years, all the physical operations disclosed by geology were going on. Many of the Fathers quoted by Professor Pusey, appear to have thus interpreted the commencement of the sacred history, understanding from it, that a considerable interval took place between the *original creation of the universe*, related in the first verse, and that series of events of which an account is given in the third and following verses.

"'Accordingly', says Professor Pusey, 'in some old editions of the English Bible, where there are no divisions into verses, you actually find a break at the end of what is now the second verse; and in Luther's Bible (Wittenburg, 1557) you have in addition, the figure I placed against the third verse, as being the beginning of the account of the creation on the first day. This is just the sort of confirmation which one wished for, because, though one would shrink from the impiety of bending the language of God's Book to any other than its obvious meaning, we cannot help fearing lest we might be unconsciously influenced by the floating opinions of our own day, and therefore turn the more anxiously to those who explained Holy Scripture before these theories existed.'—*Note*, *p.* 25.

"Thus all difficulty, arising from the immense antiquity of the Globe attested by Geology, is at once removed. The circumstances related in the succeeding verses must be understood as referring to those immediate changes by which the surface of the earth was prepared for the reception of man.—Just as the facts disclosed by astronomy, without detracting ought from the credit of the inspired historian, prove, that the sun, and moon, and planetary bodies must have existed previous to the 'fourth day,' on which he first mentions them as 'made,' or *appointed* to serve the office of 'signs and seasons, and days and years;' so Geology, in no degree contradicts the real mean-

ing of the text, by proclaiming the fact, that the air, the earth, and the waters, were peopled by living creatures for innumerable ages before that epoch in the world's history—which the sacred historian alone contemplates."

Under the sanction of this confirmation of the construction I had put on the first verse of Genesis, in my original manuscript, formed between 1819 and 1825, (and which is now greatly enlarged by the addition of the notes containing an account of the late geological discoveries, and observations upon them,) I now present this work to the public of Upper Canada, and conclude this preface with the sublime description of Eternal Wisdom given us in the 8th chapter of Proverbs; which, I trust, will justly apply to the great additional light which the modern discoveries in pneumatic science are enabled to confer on the Cosmogony of the Creation.

"The Lord possessed me in the beginning of his way, before his works of old.—v. 22.

"I was set up from everlasting, from the beginning, or even the earth was.—v. 23. (Say before the Combustion of the Gasses, as shown in this work.)

"When *there were* no depths, I was brought forth; when *there were* no fountains abounding with water.—v. 24. (At the Combustion of the Gasses, as shown in this work.)

"When he prepared the heavens, I *was* there; when he sat a compass upon the face of the depth;"—v. 27. (Say after the Combustion of the Gasses, as shown in this work.)

HENRY TAYLOR.

Toronto, Nov. 22, 1836.

PREFACE

TO THE SECOND EDITION.

Since the printing of the first Edition of this Work, I have met with several publications of high scientific character, confirmative of the System of Creation I had ventured to offer to the World. Extracts from these will be found inserted in the Body of, and in the Notes to this second Edition.

Sharon Turner, in his Sacred History of the World, 1st vol. pa. 375, says "Scientific men have traced the constituent substances of our Globe to sixty or more simple Bodies, which "at present rank as Elements, because they are not further "decomposable, and these appear to have constituted our Primordial Rocks; but, there are abundant reasons for surmising, that they are not the primitive Elements of Material "Nature; and therefore, until they can be resolved into the "particles or substances which are so, we shall not attain those "perceptions of the original composition of our multifarious "Earth, which will present the deciding and satisfactory truth. "We must know what Silica, Alumina, Magnesia, Lime, Carbon, Iron, and other Metals and primitive components of "Minerals intrinsically are, before we can actually discern "the Processes of the succession, the causations, the agencies, "the laws and the principles on which the primary and secondary masses were originally formed. The acquisition of this "further information would have been thought impossible in "the last century; but, human sagacity and industry are now "exploring what is unknown, so perseveringly, and so successfully, that every month may bring us the information, that "some diligent analyst in some country or other, may be drawing from Nature, those great secrets of her Primordial "Chemistry, which have hitherto been impervious and inaccessible."

Now, in the first edition of this work, we have given extracts from the writings of eminent Botanists and Chemists, in support of our Theory, and to prove the power of the functions of vegetation to produce many of the substances above mentioned, and we have a right to conclude, that the remainder may equally

well have been produced thereby, and by the animals of the Primeval Ocean, since *some* marine animals are well known to secrete the lime of which their shells are composed, and the Islands formed by the Coral Insect, equal in length $\frac{1}{8}$th of the diameter of the Earth. The basis of almost all the primary earths have lately been found by Sir Humphrey Davy to be metallic, and in note first of this second edition, it will be seen from Sharon Turner's work, that several metals are produced by these functions of vegetation. If this power be allowed by scientific men to these functions of Terrestrial vegetables, we certainly may, by the clearest rules of induction believe thay were also possessed by the Marine vegetable kingdom of the Primeval Oceans of Genesis,* and most likely in a higher degree, for the great end of producing the solid parts of the earth; and we have then a palpable way of accounting for these productions, namely the continual labour of some species of the Marine animals during life, and the deposition of the Marine vegetable and Animal kingdom after death; and accordingly most of the Geological bodies we are enabled to analyze are found to contain the same materials as the remains of vegetable and animal life afford.

If therefore, this Theory of the power of the vital functions of vegetation and animalization be sustained, we trust we shall have come to a sufficient knowledge of what "Silica, Alumina, Magnesia, Lime, Carbon, Iron, and the other metals and primitive compounds of rhe minerals intrinsically are:" for, if the functions of vegetable and animal life be allowed to have produced these substances in the Oceanic waters of Genesis, they must have produced them from the elements which surrounded them, namely, Oxygen, Azote, Hydrogen, Caloric, Light and Electricity blended together by the vital principle of the vegetable and animal, in proportions of vast variety, and by which variety the separate characteristics of these different substances have been produced; for, (to show the wonderful effect of variety in the proportion of the Elements of bodies,) we find, that Oxygen and Azote combined in one proportion, form the atmosphere we breathe and live in; but, the same elements combined in another proportion, produce the strong and deleterious acid Aqua Fortis or Nitric Acid. I cannot, therefore, but believe, that by our theory of the formations from the Waters of Genesis,

* Sodium, one of the new metasls discovered by Sir H. Davy is contained in all marine vegetables.

we shall be able in Sharon Turner's own words "actually to "discern the causations, the agencies, the laws, and the prin- "ciples on which the primary and secondary masses were "originally formed."

To our construction of the trüe interpretation of the first verse of Genesis in page 27,we have, in note 3d of this edition, given extracts from a recent publication of the celebrated Doctor Chalmers, who has adopted our construction of that verse.

In note 4th, we also quote from Doctor Clarke's Commentaries in further confirmation of our construction of said verse.

In note 7th to this edition, we have the great satisfaction of giving the sanction of the opinion of Mr. Arrago, (one of the leading Astronomers of the present day,) to our system of the Creation,as far as regards the formation of the earth, first, by the condensation of its waters, from aqueous vapor, and the subsequent formation of its solid parts, and organic formations. We have, indeed, since the publication of the first edition of our work, received the verbal and written approbation of it from men of science, and competent judges in these Provinces ; but, the confirmation of the system by so eminent a Philosopher of Europe, is peculiarly grateful.

In page 44, I have in this edition, ventured an idea of the design intended by the Creator,to be effected by the internal fires of the earth, namely, the end of hardening the geological bodies, which must originally have been deposited from the waters in a soft and humid state, and although we are accustomed to consider these Fires solely in a terrific point of view, they may, perhaps, be found to add one more indication of Divine Wisdom, in the final preparation of our globe, for sustaining the immense velocity,and unceasing continuity of its double motions through the regions of space.

At the close of our Theory of the Sun, and of the means of supplying the waste of his light and heat, we have added, in this second edition, some observations on the ideas stated oy Sir John Herschell, on the opaqueness of the Sun, and on the spots that appear on,or adjacent to his surface ; and it will be for this eminent Astronomer, and other men of science, should our Theory meet their perusal, to form their own judgement thereon, and also, on the questions we have proposed to them on this subject.

In note 5th to this edition, we have commented on Doctor

Buckland's opinion that vegetable and animal life did not exist previously to the transition or secondary formations. And we trust to have shewn, that as all traces of shells and organic remains may be destroyed by a heat less than is required for the fusion of the rocks that had contained them, so, the *non existence* of *life* in the earlier periods of creation *cannot be sustained ;* but that, as it is highly probable the internal fires were then much more frequent and extensive, so all appearances of the more aucient remains of vegetable and animal life must have been completely obliterated and destroyed. The recent discovéries of Sir Humphrey Davy, in his Galvanic Experiments on the primary earths, appear too, to confirm the probability of our Theory. The Granite mass is mostly composed of these primary earths, which he has found to consist of metallic bases, united to oxygen in a solid state. Now Oxygen is one of the most abundant constituents of vegetable and animal life. The bases of several metals also, we trust to have shewn in our work, are the produce of the vegetable process. Mr. Good, in his Book of Nature, page 239, says. " I have already had occasion to observe that Albumen and Fibrine are substances formed by the action of the living " principle, out of the common materials of the food, and that " it is probable the *lime* found in the bones and other parts, is " produced in the same manner."

Now, while it is allowed by all Geologists of modern date, that these *functions of life* have had so great a share in the formation of those parts of the Geological bodies, which are accessible to our examination, we may, it appears to me, conclude by reasonable induction, that the same mighty engine of formation has been employed from the " beginning" to construct the entire diameter and circumference of the earth, more especially, as we know of no agencies equal to the vital functions and their deposits, for producing formations, and I trust to have shewn also, in Note 5, to this Edition, that the idea of the incandescence of the Earth, will not render this Theory untenable.

In note 6th of this edition, will be found an extract from Good's Book of Nature, in which the opinion of the immortal Newton is stated, on the subject of an etherial and elastic medium, pervading all space in the heavens ; which opinion, we consider as a strong confirmation of that part of our system relating to the mode by which the Sun's waste of light and heat may be replenished.

I have now solely to present this second edition to the public, relying with confidence on their candid perusal of it; and hoping, that I shall have at least gained one end, that of exalting the utility of the sciences on which I have formed this system of creation, towards enabling us to discover more fully, the wisdom of the First Cause in his Creation.

In that part of the work which treats of the dissolution of the earth, we have stated an idea, that "the indestructibility of the "laws of nature, and their eternal tendency to form new com- "binations of matter, offer a proof also, of the distinct destined "existence, and of the immortality of the soul of man." (See pages 76 and 77.) If this induction be just, we may infer from our reason, that the soul is immortal, and it may perhaps offer a consolatory confirmation of the revealed religion, that its promises are found consistent with our reasoning powers; and with the inductions of science. And I ardently hope, that this power of the sciences, may tend to lead many of the rising generation to acquire a knowledge thereof, and a zeal for their future advancement, in furtherance of greater and glorious discoveries of the benevolent wisdom of our Creator.

HENRY TAYLOR.

Quebec, March, 1840.

AN ATTEMPT

TO FORM A SYSTEM

OF THE

CREATION OF OUR GLOBE, &c.

In the year of our Lord 1819, I returned to the land of my birth, the Canadas, after an absence of nigh forty years in England and Nova Scotia, during which, I had undergone great misfortunes in an extensive line of mercantile business.

The pleasing sensations I felt on this return to my native country, may have been experienced by many; the intensity with which I felt them, may have been occasioned by so long an absence; and having now, as it were, fallen into the calm and pure resort of nature, the woods of Lower Canada, I was never more happy than in the study of her works. From early youth I had been fond of the science of chemistry; and now, some books of geology fell into my hands: with them I frequently compared the appearances I met with in my walks, which, being in unison with these books, gradually confirmed me in the opinion, that our earth was originally formed in a fluid, and was deposited from it.

In the treatise on chemistry by Professor Chaptal, I found an account of the chaotic system of creation of the ancients; by which it is supposed, that the chaotic

mixture, being formed, the various substances were attracted to each other, by the laws of mutual affinity, and precipitated.

On frequent reflection, however, on this theory, and contrasting it with the general state of the depositions of the earth in strata and laminæ, it appeared to me to be totally insufficient to account for these appearances: had a chaotic mixture been formed by the Creator, containing in solution all the various geological bodies, and had nothing more been required for their formation, but the operation of their affinities and attractions, these must have taken place immediately, and they would be found deposited in homogenous, and exclusive masses, according to their various affinities and gravities: but the formations are generally found in alternate layers and laminæ of frequently mixed substances, and bear the certain marks, not only of being deposited from a fluid, but also, of a gradual and mixed deposition, at periods probably of immense distance from each other. This reflection led me to conceive that these depositions were gradually produced by some permanent and continually operating cause.

In the above mentioned work of Chaptal, I had found, and been much struck with the beautiful and interesting theory he has given of the formation of the various primitive earths, and many salts, metals and mineral substances, by the processes of vegetation, which are found on the decomposition of those vegetables by analysis and combustion: I was also aware, that vast tracts of the earth are formed by vegetable, animal and marine depositions, and being one day occupied in reading attentively, the account of the creation in the

first chapter of Genesis, the waters therein mentioned forced themselves strongly on my attention and repeated consideration, until at last, the idea grew upon me, that the geological bodies of the earth were, somehow or other, *produced in these waters.*

That the earth was formed in a fluid, I now felt thoroughly convinced of; that a great part of it, consisted of vegetable and animal depositions, even almost to the tops of the highest mountains, as stated by the geologists, seemed to me a proof, that these marine vegetables and animals must have previously existed in waters which produced these depositions; and, as no inundation or deluge is sufficient to account for these universal appearances of the formations in the earth; therefore, the waters or oceans mentioned in the first of Genesis appeared to me the only, and the truest sources by which we *can* account for them.

During my reading and reflections on this subject, and previously to my determining to form a Theory of the Creation, Archdeacon Paley's Evidences of Natural Religion fell into my hands, in which the atheistical doctrines of chance, and also, the notions of Buffon, of the earth's formation by a fragment knocked off by a Comet from the sun, is related, and commented on, by the Archdeacon.

I shall therefore, previously to advancing any thing more on the system of Creation I had gradually formed in my own mind, beg leave to make some observations on those doctrines of chance formation, and thus endeavour to clear the way for a system, I trust, more consistent with reason, and with our religion.

" Amongst inanimate substances (says Paley in

page 63 of his Theology of Nature or Evidences of Natural Religion,) a clod, a pebble, a liquid drop, *might* be, (but never was a watch, a telescope, or organised body of any kind, answering a valuable purpose by a complicated mechanism,) the effect of chance: in no assignable instance hath such a thing existed without intention, some where."

Now, it appears to me very singular, that Paley, after having so clearly exposed the absurdity of this theory of chance, should have thus conceded the possibility of a *clod*, a *pebble*, or a *liquid drop*, being the product of it: a clod is a piece or part of the earth; a pebble is a fragment of some rock rounded by the waters; a liquid drop is a part of those waters. The same cause then, that produced the earth and seas, produced also the clod, pebble, and drop.

But, can there be any doubt that the earth itself contains marks of design and intelligence? That all its vegetables and animals contain marks of design, *He* has proved: now we cannot refuse the same evidence of design in the formation of the earth and seas, if it were *solely* as a *matrix* or habitation for those plants and animals; and, among the evidences of design which these last exhibit, I beg leave to mention one which, I believe, has escaped the observation of the Archdeacon: it is the *amazing varieties* exhibited in every species of these plants and animals. Had they been solely the offspring of a "blind conatus," there would, probably, have been but one species of each of them; But their vast varieties shew a master and designing hand to have directed their formation. The evidence of design which the earth exhibits, is not confined to its own formation; this evidence is much

more strong, when we find and consider it as a part of a system of planets revolving in known periods round a central sun, whose light and heat are evidently the intended sustainers of the life and enjoyments of the plants and inhabitants existing on this family of planets.

It is also stated in page 92 of the above work, that Buffon considers the Planets to have been "shivered off the sun by some stroke of a comet." Paley adds, "that he never could see the difference between the antiquated 'System of Atoms,' and Buffon's 'Organic Molecules;'" and that "this philosopher having made a planet, by knocking off from the sun a piece of melted glass, in consequence of the stroke of a comet, and having set it in motion by the same stroke, both round its own axis and the sun, finds his next difficulty to be how to bring plants and animals upon it," &c.

Now, as to the solid parts of the earth; allowing glass to be composed of a variety of materials, yet, I believe no part of the interior of the earth is discovered to be vitreous, except in the vicinity of volcanic mountains, or where these have previously existed. How then has this glass, of which Buffon supposes the earth to have been formed; how has it been metamorphosed into the vast variety of mineral products which geology discovers to us? The internal substance of the earth down to its centre, is supposed to be granite or bodies of greater density; and neither granite, nor the more external formations bear any resemblance to vitreous or volcanic matter.

But, if even the solid parts of our earth, will not support such a theory, how are we to account by it for

our waters ? Is it in the midst of the molten glass of a burning sun, we are to look for them ? Water, even in in a state of vapour, could not exist there, but must have been driven off to immense distances, or else decomposed by the sun's fire : Water, however, is said to constitute three-fourths of the Earth's surface, and the total inability of this theory or supposition, to account for its production, appears to me decisive against its foundation in reality. (*Vide 1st & 2nd paragraph of Note 4th.*)

I shall now notice the opinions on Chance or Atheism, as causes to account for the productions of nature, in our Globe.

The Organic Molecules of Buffon are thus stated by Paley, in page 427 of the above Work, Evidences of Natural Religion, namely : " we are to suppose the Universe replenished with particles endowed with life, but without organization of their own, and endowed, also, with a tendency to marshal themselves into organized forms."

It appears to me almost impossible that the author of this doctrine, if it be Buffon, could rest satisfied with this cause of Creation ; because, although it should be allowed that these particles of life could infuse themselves into organized bodies, we naturally enquire, how came these particles themselves into the universe ? This is the secret, undiscoverable without allowing an " unknown cause." If Buffon would account for the existence of these particles by chance, I say, that from the time of their finding their way into these Molecules, or organized forms, there is so much, and so constantly exhibited in every one of these forms, what we call, in

plain language, intelligence and design to produce good and wise ends; that the term Chance, in the sense in which it would be employed by these Atheistical writers, completely comprehends intelligence and design; for these are found inseparable from these organized forms; therefore, the Doctrine of Chance, instead of confuting, proves the existence of an Unknown Creating Cause.

Were the term Chance to be understood merely in the common acceptation of the term, as existing, for instance, in many of the events of life, it will still always be considered as too absurd and impotent to account for the productions of Nature, because it is *not* in the nature of the human mind to rest satisfied with what, I trust, may be fairly called a Buffoonery system of Creation.

Now, therefore, to finish with this, and with the notion of the planets being knocked off from the Sun; to account for their creation thereby, without an Intelligent Creator, I must say, I feel it to be a daring thing of this or any writer, to have attempted the overthrow of the established opinions of all Christian nations, as set forth in the Scriptures handed down to us from the people whom it appears to me, were chosen by the design of Heaven to preserve mankind in the faith and worship of one Creator, and which are, I believe, supported in their principal facts by the immortal Newton, in his system of the Universe, and certainly believed by him.

Previous to thus presuming to overthrow this sacred religion, it appears to me, this author should have formed a system less replete with absurdity, but fortu-

nately too much so, to produce extensively any evil effects. Christians, in general, are fixed in their notions of the true cause of all they see, taste, and feel around them, and of their own existence. The Jewish Nation was taught by a religion which, from the days of Adam, had been followed by mankind,—a belief in one Almighty Creator of all things. This belief had nearly, however, disappeared from the earth in succeeding ages. Men, enervated by the effects of those hot climates, and sunk in consequent sensuality, were tempted to throw off the wholesome restraints of a pure religion, and gradually fell into an idolatry, whose ministers, probably, permitted these sensual habits, to confirm their own power over these people. The Jews, alone, had preserved the worship of one Almighty Creator, until their prosperity, after the deliverance from Egyptian bondage, had sunk them into the same idolatrous practices as their forefathers.

And here I beg leave to observe, that this repeated defection of the Jews, and of the rest of mankind, from the worship of one God, appears to me a strong proof that *Deism alone*, in its purest state, is not sufficient to prevent mankind from falling into idolatrous worship. But, the Saviour promised in the Scriptures by the inspired writers, arose at length to astonish mankind, and to bring them back for ever from that idolatry to a religion which alone is worthy of the highest degree of intelligence to which the mind of man can arrive ; a religion which, while it allows him the most extended use of that intelligence in the contemplation of the works of Creation, teaches him, also, to be contented with the limits which appear to be fixed to it ; and being convinced of the existence of an Almighty Pro-

tector, to feel the glowing pleasure of the adoration of Him, to be among his purest and most comforting sensations.

These cheering feelings of the heart and mind, cold and joyless Atheism is void of, and thereby its errors are proved; because the almost universal feeling of these emotions, and their cultivation by nations who have at all risen above idolatrous worship, is a proof that these emotions came from the hands af Nature and Reason, and they appear to form the links of a chain which connects this with a future state of existence.

The supporters of the Doctrine of Chance, however, disdaining to be contented with the Scriptural account of Creation, have formed various wild and futile notions to account for it, in order, no doubt, to seek for distinction by opposing the generally received doctrines; but finding, as I trust to have shewn, the total *impotence* of *Chance*, of APPETENCIES, PRINCIPLES of ORDER, POSSIBLE COMBINATIONS OF MATERIAL FORMS, and of LAWS OF NATURE, &c. &c., to satisfy the inquisitive mind of man, they have been obliged to conclude with telling us, "that neither they nor we know any thing about the matter." (*Vide page 7 of Paley's Theology.*)

But, at that very point, where they have thus found themselves stopt in the extension of their enquiries, is seen "the God whom we worship." There, when this proud, but false philosophy finds its ignorance begin to darken it, we have the clear and powerful light of this true religion to illuminate us, and to teach us to rest satisfied with the impenetrable veil which its

author has pleased to fix between Himself and His creatures in this stage of existence.

Of a kin to these doctrines of chance-Creation is the idea of the Materiality of the *Human Soul;* and previous to dismissing this part of the subject, I beg leave of the reader to offer some observations on this Doctrine of Materiality.

The Materialist supposes, that all the powers of the mind of man result from his *Organization* alone. It follows, then, as a natural consequence, that when this organization is destroyed, the mind is destroyed along with it. Materialism, then, necessarily leads us to a disbelief in a future state.

Now, in no parts of Nature do we find faculties bestowed, which are not generally, productive of certain purposes to these parts; therefore, if man were destined solely for existence on this earth; if his thoughts were solely the effects of the organization of his frame; is it not probable his thoughts would have been confined to the actual sphere of his destined existence? Would he not have been unable to form those high imaginations and hopes of eternal happiness in more perfect regions?

For, if we may reason from the vast body of evidence of her works, Nature does nothing, nor bestows nothing, in vain: she never appears to act with deception; therefore would not have given to man of all ages and nations those hopes of future happiness merely to disappoint them. "I am positive I have a soul," says Laurence Sterne, "nor shall all the books with which Materialists have pestered the world, ever convince me to the contrary."

The vast powers of intellect and of science, by which man has been enabled to observe and to trace so exactly, the astonishing systems of the heavenly bodies; those high passions and thoughts of future bliss which he is thereby led to hope for, in some such regions, partake too much of the nature of Spirit to suffer us to think they are solely produced by a more perfect organization than is bestowed on the horse, the mule or the ass.

It moreover has been proved by the anatomy of the brain of the Ourang Outang, an animal approaching nearer to the human species than any other, that its brain exactly resembles that of the human species; and it is said, "it is surprising this resemblance is productive of so few advantages; the tongue and all the organs of the voice are similar, and yet the animal is dumb; the brain is formed in the same manner, and yet the creature wants reason; an EVIDENT PROOF, [as Buffon finely observes,] that *no arrangement of matter will give mind*, and that the body, how nicely soever formed, is formed to very limited ends, when there is not infused *a soul to direct its operations;*"— and I am the more happy in giving this quotation, as it shews that Buffon has indeed the redeeming quality of not acceeding to, but of disproving, the degrading Doctrine of Materiality. We feel indeed less surprised at the invention of such a doctrine, when we are informed who are its abettors or authors. Persons, who, in the practice of their art, having been long habituated to dissections of the human body, have thereby become more apt to form their notions from their eyes than from the reflections of their minds, have sought to make the world believe, that the superiority of the mind

of man over other animals, arose merely from a more perfect organization of the brain ; and such an assertion reminds us of the Alchemists, who sought for the Philosophers' Stone in some of the most loathsome objects of nature. Had the Materialists watched and studied the operations of their own hearts and minds, in the hours of calm contemplation ; had they allowed these parts of their frames to exert a due influence over their opinions,they would, probably, have felt the force of the great poet's assertion,"'Tis the DIVINITY which stirs within us."

They may, indeed, have carried their anatomical science and skill to that exact point where body meets spirit ; they may have discovered the precious matrix in which this "immortal spirit" is destined at present to reside ; but, they would not thus have presumed to degrade its nature and its future destiny.

In fine, this material doctrine of the mind may well be said to savor too much of the shop, and no well cultivated mind can, I think, for a moment assent to so degrading a doctrine ;—and I shall conclude this subject with an observation I have made on the separate existence of mind from body, *even* in this world. When two persons converse together, the ideas of their minds pass from the organs of speech, through the air intervening between the two persons : in this passage, therefore, *mind exists separate from the body from whence it came.* It is conveyed, indeed, by the vibrations of the particles of air it passes through, but it certainly has, during that period, an existence separate from the body and organs it proceeded from. Mind, therefore, can exist separate from its matrix, and does

not seem to be entirely dependent on it for that existence.

I now resume the narration of the course of thought which has led me to form the present attempt at a theory of the Creation of our system, and, by analogy, of the other systems of the heavenly bodies.

Being, as before stated,convinced the earth had been originally formed in water, the enquiry, then, naturally suggested itself, what waters we had any historical account of which could produce this effect ? The chaotic liquor of the ancients, I trust to have proved, is incompetent to account for the general geological appearances, and therefore fails. The waters of the Deluge can only account for certain changes in the earth's surface, which they may have occasioned, and which, no doubt, give proofs of the reality of that Deluge. But, the proof of formation in a fluid, reach far below the possible effects of an inundation which lasted only one year. The vast masses of marine depositions must have required numerous ages to accumulate, and even the granite mass gives proofs of formation or of alteration in a fluid, by the chrystals and heterogenous substances it consists of; and this stupendous mass, which is supposed to form the whole interior of the globe, must have required a correspondent time for that formation.

To shew that it is not without good cause, we, in this work, attempt to vindicate the Mosaic account of Creation, and, by our explanation of the first verse of Genesis, to account for the immense period of time required by the modern Geologists ; we extract the following Note from a late work on Geology : "Although " the world is not eternal, it is nevertheless very an-

" cient, and, in calculating all the time that was " required for the formation of the numerous beds " which the globe presents to us, for the life and re- " production of all the animals and vegetables whose " remains it contains, according to the time employed " for the actual formations whose duration we know, " we are forced to admit that the world is at least " 300,000 years old."—*Boubée's Geol. Populaire, page 7, Paris* 1833.

The only waters, therefore, with which History furnishes us to account for these phenomena, are certainly the waters of Genesis. I then proceeded to enquire if the scriptural account of these waters would warrant the conclusion,that the earth was formed in them by the deposition of the strata and other rocks which the latest discoveries in the science of geology have pronounced it to consist of.

After a long and mature consideration I conceived, that the first verse of Genesis, " In the beginning God created the Heavens and the Earth," will not only warrant the above conclusion ; but, perhaps, also a like formation of all the planets and suns of other systems ; by the highly natural causes and effects of those laws, which the latest discoveries of Geology and Pneumatic Chemistry have found to exist.

I further considered, that if the scriptural account of Creation could thus be reconciled to those discoveries ; —if the Geology of the whole earth could thus be brought in proof of the reality and necessary existence of those waters ; the doubts of the Unbeliever might yield to it, and the authority of Scripture acquire new forces.

" In the beginning God created the heavens and the earth." Now, the term beginning points to *no specific point of time* ; and I have therefore conceived it may have been *ages* previous to the time of the separation of the earth from the waters as mentioned in the ensuing verses ; and that during *these ages*, the earth was gradually formed in these waters.—(*See Note 3d to 2d Edition at the end of the Book.*)

By the famous discoveries of Black, Priestly, Lavosier, and other chemists and philosophers, a new world has been disclosed to us. The constituent part of three-fourths of the globe, water, which was formerly considered as an element of Creation, has by these discoveries, been proved to consist of two separate bodies, Oxygen and Hydrogen. Our atmosphere itself, the common air, is no longer to be considered as one of these elements : it is composed of the oxygen and the azotic gasses ; but neither oxygen nor hyhrogen, nor azote, have ever been obtained separate, in a liquid state. They have yet been found only in the form of gasses, that is, combined with light and caloric. By the combustion of hydrogen or inflammable gas in oxygen gas, the caloric and light of the latter escapes, and water is formed, in a quantity exactly corresponding with the weight of the gasses employed in the combustion; and the same water may again be decomposed, and returned into the state of the gasses it was composed of. If, therefore, this be incontrovertibly proved, and as all philosophical chemists are now agreed upon the fact—it follows, that the Waters of the *Universe* recorded in Genesis, MUST have been formed by the combustion of these gasses ; it follows, that if any part of these waters are composed of them, every

part must; and, therefore, that the Deity, having first called these gasses into existence, *did*, either by the power of electricity, the blaze of comets, or some other means, ignite the hydrogen gas, which, by its combustion in the oxygen gas; of which the empyreal atmosphere may have been partly composed, produced the *Universal waters of Genesis.*—(*See Note 4th to 2d Edition at the end of this Work.*)

These waters must have been thus first produced in a state of vapour, which, condensing into a liquid form would, by laws of attraction, form the Universal Ocean, the matrix of our earth, and planets of our system.* The vast body of heat and light disengaged from this immense combustion, may have formed the Sun of our system, which, by the laws of its gravity and attraction, assumed its place in the centre of it, as we shall attempt to show in the Theory of the Sun's formation.—(*See the third and fourth paragraph of Note* 4, 1*st Edition.*)

We have now to enquire in what way, and by what laws, the Creator produced, from these waters, all the solid parts of our earth? To form the ground-work of our reasoning on this subject, we shall advert to, and consider attentively, the accounts of the Geologists of the marine strata and productions found in the bowels of the earth, and the experiments and opinions of some eminent Chemists upon the nature and products of the processes of vegetation.

"The Levels," says Cuvier, one of the most eminent Geologists of the present day, "on which marine productions are now found, are far above the level of the

* See Note 7th to 2d Edition, at end of this Work.

ocean, and at heights to which the sea could not reach by the action of any known cause. Every part of the earth, every continent, and every island, exhibits the same phenomenon. The traces of revolution become more apparent, when we ascend a little higher, and approach nearer to the great chains of mountains. Beds of shells are still found here, but not of the same species as those in less elevated regions. When we ascend to greater elevations, and advance to the summits of the highest mountains, remains of marine animals grow more rare, and at length, disappear entirely ; but the chrystallization, and many other characters of these rocks, shew them to have been *formed in a fluid*, &c. &c.

" It is impossible, therefore, to deny, that the waters of the sea have formerly, and for a great length of time, covered those masses of matter which now constitute our highest mountains ; and further, that for a long time, these waters did not support any living thing."

This last sentence is the only one from which our Theory differs, and we refer the reader to Note 2d of 1st Edition, in support of it.

Thus we have the evidence of Geology, that every part of the earth contains marine remains, and that even the summits of the highest mountains, where these marine depositions cease to be found, give yet evidence of *formation by fluidity.*

That these marine remains are not found in these summits may, I think, be satisfactorily accounted for. Many remains are found in the same forms as when they contained the living animals ; but, on taking them up, they crumble into impalpable powder.

The summits, therefore, of these mountains, have probably contained these marine remains in previous ages; but being contiguous to the earth's surface, have, by the joint action of the air and rains, lost their organization, been converted into their component substances, and been incorporated with other mineral, metallic, or earthly bodies. Thus, all marble, lime stone, and chalk are found to consist of precisely the *same materials* as every marine shell; all are formed of lime and carbonic acid; and, it is therefore evident, that when the masses of shells shall be so far acted upon by the moisture of the earth, rains, internal fires and mineral *solvents*, as to lose their forms, and be converted into powder; that these agents, acting on and percolating through them in various degrees will reduce them into beds of chalk, or lime stone, or marble, and, I think it not improbable, the chalk and lime stone formations of the earth have been, in the course of ages, formed in this manner. This idea I have seen confirmed by Mr. John Wesley, in his "Survey of the Wisdom of God in the Creation." He says, in vol. 2d, page 256, "Chalk is no more than the ruins of sea shells, and lime stones consist of the same bodies cemented together by stony matter." Again, "where the tree falls there it lays," says the Proverb. Any person who has seen and noticed the aboriginal forests of the earth, will have observed these trees in various stages of decay—many of them reduced to a state of dust or earth; and these causes, in the course of time form hills and hillocks. In accounting for the origin of peat earth and morasses of black soil in Britain, a late writer has, therefore, very properly, I think, assigned their origin to arise from the gradual falling and decay of trees in ancient times, which, falling in marshy or swampy places, have de-

cayed and acquired their black colour. In a great many parts of America, it is well known large tracts of land are found in this state, being covered by masses of black earth of various degrees of consistence, from two to eight feet deep. The subsoil frequently clay. In an article lately published in one of the English papers, there is an account, confirming the opinion, that part of the coast of Australia, in the South Seas, has been entirely formed by the manure of birds called the *Pettrel*, found there in such astonishing quantities, that flocks of them are seen to cover a vast extent of the atmosphere for days together.

These facts, therefore, offer corroborating testimony, that large tracts of the earth can, and have been formed by the depositions of vegetables and animals.—(*See Note* 1.)

In a Geological work lately published in England, we have the following account of the order of succession of the different layers of rocks which compose the crust of the earth :—

	Instances where found.
A. Vegetable soil.	Mouth of the Thames.
B. Sand, Clay, Gravel, with bones of same species as now exist.	and other Rivers.
C. Deep beds of Gravel, large loose blocks of Sand, all containing bones of animals belonging to species now extinct.	Surface of many parts of England, and especially the east and south-western parts.

TERTIARY STRATA.

D.	Sand, Clay, Pebbles, beds of Sand, white Sand-stone, many sea Shells, bones of extinct species of animals.	Hampstead Heath, Bagshot Heath, coast of Suffolk and Norfolk, the stone of which Windsor Castle is built.
E.	Alternations of Lime Stone, containing fresh water Shells, Clays, of different qualities, and Lime Stone containing Marine Shells.	Isle of White in England.
F.	Thick beds of Clay, many Sea Shells, beds of Lime Stone, remains of extinct species of plants and fruits, land and amphibious animals.	Many places round London, and a great part of Essex and north-east of Kent, Isle of Sheppy.

SECONDARY STRATA.

G.	Chalk with Flints. Do. without do.	Dover Cliffs, Brighton, Hertfordshire, Flamborough Head, in Yorkshire, England.
H.	*a.* Chalk Marle.	Many parts of s. coast.
	b. Green Sand.	Many parts of Kent and Sussex.

c. Thick beds of Clay.	The Wolds of Kent, Surrey and Sussex.
d. Yellow Sand with beds of Iron.	Neighbourhood of Hastings, in the Isle of Purbeck.

In an account of the Geological appearances from the Lands' End, in England, towards the vicinity of London, the following facts are stated :—

The principal groups of secondary rocks, from the primary strata to the Chalk group, form the upper or more recent members of the division.

The Chalk group, the Oolite group, the Red Marle group, the Coal group, the Mountain Lime Stone group, the old Red Sand Stone group, the Graiwacke group, are of the following thicknesses :

Mountain Lime Stone group, 900 feet thick.

Old Red Sand Stone group, 1500 feet thick.

Coal group, 1700 feet thick.

Red Marle group contains mines of salt and marbles, alabaster and magnesia, with marine skeletons : its thickness is 2100 feet.

The Oolite group contains about twelve alternations of subordinate beds or systems of beds, consisting of Lime Stones of different qualities, and of Clays : their united thickness being about 2600 feet, of which 1100 are formed of two beds of Clay of five and 600 feet each. The whole group contains a vast abundance of ***animal remains, almost exclusively marine.***

The Chalk group is separated from the Oolite group by several beds of sands, Clays, and Sand Stones, and, including them, is 1900 feet thick. It extends from Flamborough Head, in Yorkshire, to Weymouth. The whole group *abounds in organic remains* of the same classes as Winford in the Oolite group.

Thus it appears, that both the tertiary and secondary formations of the earth, contain vast masses of the remains of marine productions, many of them belonging to species now extinct. Many of these latter are said to have been of enormous sizes.

The Chalk and Lime Stone formations, as I have above stated,may have been formed of the disintegration of marine shells, which had been deposited perhaps for ages previous to those which yet preserve their organic forms, as we daily find many of them in a state of disintegration, and their chemical analysis is precisely the same with Chalk and Lime Stone.—(*See 4th paragraph of Note 2, to 1st Edition.*)

The Coal formations must probably have been produced by the decomposition of marine vegetables, as they reach far too much below the surface of the earth to suppose them to be formed by those of a terrestrial species.

The seams of Coal which lay below the secondary formations at least, must, in my humble opinion, have been formed by depositions from the Marine Plants, before the separation of Genesis, as I cannot conceive that the vast masses which constitute the secondary rocks can have been produced solely by any Deluge or Inundation.

Now then, to refer to the words of Cuvier, "the "Levels on which marine productions are now found, "are far above the level of the ocean,and at heights to "which the sea could not reach by the action of any "known cause."

To what cause can we then ascribe this phenomenon, but to the substantial, plain, and simple one the original formation of the earth? All its geological appearances give evidence of formation in a fluid. Of no waters have we any record sufficient to account for these facts, save the waters recorded in Genesis. These, therefore, forcibly press themselves on our attention, and appear to me perfectly competent to clear up all these phenomena of Creation.

But water alone, that is, holding no extraneous substances in solution, either partial or complete, *deposits nothing*. All its depositions are found to proceed from extraneous bodies. The petrifying power of certain waters, of which such fabulous opinions have formerly existed, is solely owing to the deposition of earths or salts it had previously dissolved, completely or partially.

We shall, therefore, proceed to state our humble conceptions of those laws of nature, which the Creator may have chosen for the gradual formation of our earth in the waters of Genesis, on the ground work mentioned above, regarding the 1st verse of the 1st chapter of that book.

GENESIS, 1st chap. 1st verse.—"In the beginning God created the heavens and the earth."

I wish first to premise, that as I consider this scriptural account of Creation, to be the only one by which

we can, naturally and reasonably, account for the geological phenomena of our earth; so, the only thing in which I differ from the, hitherto, received opinions of that Creation is, in the construction which, (from a desire to account for these phenomena, and to reconcile them with the scriptural accounts,) I have put upon the meaning of this 1st verse of Genesis.

As before observed, I had in the course of these studies of nature, been led by them, and by reading and reflection, gradually to come to such a construction of that verse as the following: that the term "The beginning," *pointing to no specific time*, so it may refer to numerous ages previous to the separation of the waters from the waters mentioned in the 6th, 7th, and 9th verses; and I moreover consider, that every man hath a perfect right to form such a construction of the Word of God as his understanding, after mature reflection on His works, and a diligent study of them, may, by that understanding be led to, and more especially when his design is good, when he conceives he is, thereby not only adding weight and authority to these scriptures, by bringing the evidence of the geology of every part of the globe to their confirmation, but, perhaps, silencing thereby the infidelity of the sceptic, and (as he may hope) exhibiting, in a stronger light, the Power, Wisdom, and Glory of his Creator.

In the 2d verse of Genesis it is said, "And the earth was without form, and void, and darkness was upon the face of the deep, and the Spirit of God moved upon the face of the Waters."

By this verse, it would appear, the Earth was, completely covered by the waters : otherwise, the Spirit would have been recorded,as having also, moved upon the land ; and the 9th verse is confirmative of this circumstance, for it says, " And God said, let the Waters under the Heavens be gathered together unto one place, and let the Dry Land appear ; and it was so." This event, then, I consider to have happened many ages after the time of the first verse ; which verse,I further consider, to point exactly to that period, to which the Psalmist David, in the 102 Psalm, 25th verse, refers : " Thou Lord in the beginning hast laid the *foundations of the Earth* ;" and I consider this foundation to have been, the formation of the aqueous globe of our theory,—the Universal Waters of Genesis.

We now proceed to our statement :

The sea, or globe of water, mentioned above to have been formed by those gasses which the modern discoveries in pneumatic chemistry prove all water to be formed of, and being destined by the Creator to produce habitable Earth or Land, we shall conceive this aqueous globe to have been endowed by Him for that purpose, with amazing prolific powers of life, both of the vegetable and animal nature.

The remains of many of those marine animals,whose skeletons have been lately discovered in the earth, of a species never known to have inhabited our seas, are of gigantic stature and dimensions, as compared to those of any existing species.

The marine Shells, the Chalks, and Lime Stone formations, which I consider to have been produced, as

above observed, by the gradual disintegration of these shells in the course of sufficient ages : the vast Coal formations, also, prove the amazing masses of animal and vegetable life, which we shall now suppose, according to our theory, to have existed in those Waters of Genesis ; and for proofs of which, we accordingly refer our readers to the geological statements in the preceding pages.

To account further for the primary earths, LIME, SILEX or SAND, SAND STONES, FLINTS, GRAVELS, CLAYS or ALLUMINOUS EARTHS, TERRA PONDEROSA, MAGNESIAN EARTHS, SALT FORMATIONS, METALS, MINERAL SUBSTANCES *of all kinds*, and the ROCKS and other SUBSTANCES COMPOSED OF THEM and of the PRIMARY EARTHS, we shall now proceed to a statement of those experiments, opinions and theories, which have been performed and maintained by several eminent chemical philosophers on this important head.

In the treatise on Chemistry by Professor Chaptal, mentioned in pages 1st and 2d, the following facts are stated to have resulted from the analysis made by him of certain vegetables :

" The herb Patience affords sulphur : vegetables in their analysis, likewise present us with certain metals, as Iron, Gold, and Manganese. The Iron forms nearly one-twelfth of the ashes of hard-wood. It may be extracted by the magnet ; but it is seldom in a naked state, but is combined with the acids of vegetation. The Iron is not imbibed from the Earth, but is FORMED BY THE VEGETATIVE PROCESS. Lime, constantly enough, forms *seven-tenths* of the

fixed residue of vegetable incineration, usually combined with the carbonic acid. Next to Lime, Alumine is the most abundant earth in vegetables; and next Magnesia.—Silicious earth likewise exists, but less abundantly ; least common of all is Barytes or Terra Ponderosa."

As an evident and sufficient proof that all the products of vegetables are produced by the water, and perhaps the air, necessary for their growth, I extract also the following observation of Professor Chaptal : " It appears proved by Van Helmont, that vegetables can live and grow with only air and water. He planted a willow weighing 59 lbs., and watered it with *distilled water* five years. It increased to 169 lbs. : the earth it was grown in lost *only two ounces.*" If one vegetable be thus proved to acquire its growth from water and air, the strong probability is, that, as Chaptal says, " all others do," and by the uniformity of the laws of Nature, we may conclude this law applies generally to the vegetative process. (*See Note* 15.)

Thus, although Sir Humphrey Davy supposes, but does not assert, the fact, that these earths are taken up by the vegetation from the soils around them ; yet, as he does, in another part of his writings admit, that all substances, before entering the tubes of vegetables in nutrition, must be reduced to a state of complete solution in a liquid before that absorption can take place ; and as it is well known that argillaceous earth, or allumine, silex or sand, and magnesia, are almost insoluble in water, and that lime is only soluble in very small quantities ; I have therefore concluded, that such a perfect and sufficient solution, as Davy admits to be necessary, is impracticable, and, therefore, that the

assertion, (grounded on the forementioned experiments, by Chaptal and Van Helmont, namely, that these Earths, Metals, and Minerals, are *really and entirely* the products of the vegetative process,) is much more probable ; and I am the more confirmed in this probability by the following facts and reasoning upon them :

1st. As oxygen, we know, exists in a solid state, in all the oxyds, so it is not impossible, that the bases of these oxyds, the metals, and several of the primary earths, may be formed by the vegetative process, as the French Geologist, Chaptal, asserts, " to replace the constant waste that takes place of the crust of the earth, by the rains, streams, and rivers."

One hundred pounds of Lead, is, I believe, found, by calcination or oxydation, to augment in weight to one hundred and ten pounds, thus absorbing ten pounds of *solid oxygen* from the oxygenous gas of the atmosphere, which can be recovered by deoxydation. Pit Coal contains a great qnantity of Hydrogen, most probably in a solid state : Pot-ash has yielded to Sir Humphrey Davy a metallic button ; and is, therefore, an oxyd, and also contains oxygen in a solid state.

2d. The Schisti, or Slate Mountains, are said also to be formed by the decomposition of vegetables, and the Coal formations, also, to consist of the residue of vegetables, probably charred by a close heat, and must, therefore, be formed of the carbo and constituent Gasses of those vegetables. If such dense substances can be thus, in part, compounded of a gazeous substance, there is an equal probability, that the gazes

separated by the vegetative processes from the air and water necessary to their nutrition, may compose the Primary Earths, Salts, Minerals, and Metallic substances obtained from them by decomposition or incineration ; and I think it not improbable that future experiments may prove, that all the primitive earths, metals, and mineral substances, are composed of the primary elements, as we are now philosophically bound to consider them, OXYGEN, HYDROGEN, AZOTE, combined in proportions innumerable as those products themselves, and from which variety of proportion they receive their distinctive characteristics.—(*See Note* 9.)

3d. As an important and additional proof that the process of vegetation *certainly* generates and produces one of the most abundant and most dense primary earths in nature, namely, Silex, Siliceous Earth, or, as I shall call it, the Sandy principle, I extract the following from the Elements of the Science of Botany, by the celebrated and indefatigable Linnæus :—

" In many parts of the East Indies, there has long been a medicine in high repute, called ' *Tabasheer*,' obtained from a substance found in the hollow stem of the Bamboo. It has undergone a chemical examination, and proved to be an earthy substance, principally of a flinty nature ; this substance is also found in the Bamboo in England. In the hot-house of Dr. Pitcairn, in Islington, subsequently to this time, there was found, in one of the joints of a Bamboo, which grew there, a solid pebble, about the size of a pea. The pebble was of an irregular form, of a dark brown

or black internally : it was reddish brown, of a close dull texture, much like some martial siliceous stones. In one corner were shining particles, which appeared to be chrystals, but too minute to be distinguished by the microscope. This substance was so hard as to cut glass. The cuticle, or exterior covering of straw, has also a portion of matter in its composition, from which, when burnt, it makes an exquisitely fine powder for giving the last polish to marble, a use to which it has been employed time immemorial, without the principle being philosophically known. In the great heat in the East Indies, it is not uncommon for large tracts of reeds to be set on fire on their motion by the wind, which I conjecture must arise from the flinty substance of their leaves rubbing against each other. These facts cannot avoid presenting to the mind at one view the boundless laws of nature. While a simple vegetable is secreting the most *volatile and evanescent perfumes*, it also secretes a substance, which, is an *ingredient in the primeval mountains of the globe.*"

These facts, which have produced the assent of this *Prince* of Botanists, to the formation of a first rate primary earth, by the process of vegetation, are, I think, sufficient proofs, in conjunction with those above stated, that all the primary earths, the metals, and mineral substances, and, of course, all the rocks compounded of them, have been originally formed by the processes of vegetation, and animalization —(*See Note* 1, 2, 3, *and* 14.—*and Vide Note* 1, *2nd Edition, at end of this Work.*)

Vast tracts of the interior of the earth have as above, been shewn to consist of the shells and remains of marine animals.

The Chalk and Lime Stone formations, I trust to have shewn, have also resulted from the same remains ; and also, that the Coal formations have been produced by the residue of marine vegetables and a charring heat, as well as the Schisti or Slate Mountains : as, therefore, the proofs narrated in the foregoing pages, and the notes referring to them, are, I trust, convincing, that every part of the earth has been formed in a fluid ; that many parts are visibly the remains of vegetable and animal decomposition, and that most of the geological bodies are resolvable into the elements of vegetable and animal life ; we now arrive at the conclusion, THAT THE PROCESSES OF VEGETATION, AND OF ANIMALIZATION, WERE THE MACHINERY CHOSEN BY THE FIRST CAUSE FOR GRADUALLY PRODUCING, IN THE COURSE OF SUFFICIENT AGES, IN THE WATERS OF GENESIS, THE VARIOUS GENERATIONS OF VEGETABLE AND ANIMAL LIFE, WHICH BY THEIR GROWTH, DECAY ; THEIR DEATH, DECOMPOSITION ; AND DEPOSITIONS HAVE PRODUCED ALL THE GEOLOGICAL BODIES OF WHICH OUR EARTH IS COMPOSED. These Bodies, as they were depositing, have been attracted towards the centre of the aqueous globe by the great and universal law of attraction ; and before and since the separation, have, by the effects of internal fires, convulsions, or the electric power, acquired their present appearances.—(*See Note 5th, to 2d Edition, at end of this Work.*)

Thus, the Law of Gravity or Attraction would necessarily occasion a vast pressure towards the centre of the aqueous globe, of all the particles of the geological bodies. The vegetable and animal remains of which they were formed, as stated above, would pass through

various stages of fermentation. Heat, inflammable and other gasses, would be thereby generated; and these internal fires must have been in operation, pending many of the ages required for the formation of the entire diameter of the Earth in the Waters of Genesis. Hence must have arisen, long before the separation of these waters, not only internal changes in the forms and original composition of the congregated masses of the geological bodies, but also numerous commotions in the interior parts, which have produced probably many of the mountains, and must certainly have produced those depressions on the surface of the earth, which served to form the beds of the original oceans or seas,formed at the time of the separation of the waters.

These internal fires of the Earth, though at first sight they appear to us the effects of accidental causes, will probably, be found to be an instance of the designing Wisdom of the Author of Nature. The depositions from the Ocean, which, by our theory, have formed the Earth, must have been originally deposited in a soft state. By the continued pressure of the subsequent Geological particles towards the centre, they would no doubt acquire a degree of solidity, but, perhaps, the operation of these fires was required to give them sufficient hardness to resist the powerful action of the rapid motions of the Earth, just as we find Clay is hardened into Brick by heat. These fires are at the present day, considered by the first Geologists to be occasioned by Water coming into contact with the Metallic bases of the Primary Earths, by which the water is decomposed and combustion ensues; and in this case an absorption of oxygen by these bases must take place, and their bulk greatly increased, and this

may have been designed by the Creator for enlarging the bulk of the Earth.

The electric agency, also, has probably had great influence in these internal changes, both previous to and since the time of the separation, and on the subject of the internal and external changes in and on the Earth, I refer the reader to the attentive perusal of the Notes, but more especially Notes 7, 10, 13 and 14.

And as it is very remarkable, that no mention is made in the first chap. of Genesis of the creation of any of the Marine Plants of the Ocean, I will conclude this part of the subject with an observation on that remarkable circumstance—namely—that it appears to me indicative of the possible truth of the theory I have presumed to offer, that the first verse of Genesis refers to a *preparatory process of the Creation*, totally distinct in its time and nature from the separation of the waters and the primeval appearance of the dry land as recorded in the ensuing verses, which took place in the six days, at the separation of the waters recorded in Genesis, 1st chap.

Because, the Creation of the vast body of the marine plants required for the purpose of nutriment for the marine animals of those waters, who, by their death, decay, and depositions formed part of the machinery of the Creator for producing the earth, the creation of those plants having taken place at the beginning, as in the first verse, (being the *preparatory process* of the creation, by which the Dry Land was, in subsequent ages, to be produced,) no need was that mention should be made of their creation at the period of the separation, when the land animals and vegetables were brought into being; for, and because, these ma-

rine plants were included in the record of the first verse, " In the beginning," &c.—(*See Notes* 7, 10 and 13.)

In the preceding System of the Creation which I have ventured to form, and to which I was determined, as observed above, on reading the ideas stated by Archdeacon Paley to have been promulgated to the world by Buffon and other philosophers, I have made some remarks on the assertion, or supposition of Buffon, that the globe we inhabit was formed by the stroke of a Comet knocking off from the Sun, (as stated by Paley,) a piece of molten glass, and I trust to have shewn the great improbability and absurdity of this. Such a supposition would lead us to believe, that the creation of our planetary system was not the gift of an all bountiful Creator, but merely the effect of Chance; and if I have proceeded to any severe reflections on its irreligious tendency, I trust I am warranted therein, by the opinions given by Paley, of this doctrine being founded on Atheistical principles; that is, if I understand it, denying the agency of a Supreme Ruler of the Universe in the Works of Nature.

An opinion, so contrary to all our natural feelings of religion, it appeared to me, the duty of every man to refute, whose understanding should dictate to him the errors of such a system—and I hope to have shewn, that, as it is completely unsatisfactory to the mind of man, in the highest state of its acquirements—so, it never can he productive of general or extensive assent; and in the following compendium of my Theory of the Sun's Formation, I shall re-advert to the above supposition of Buffon.

THEORY OF THE SUN'S FORMATION.

I now proceed, with due humility, to present to the reader, a compendium of the ideas above stated, on the Sun's Formation, at the time the primordial waters of Genesis were created, according to the construction I have put on the 1st verse of the 1st chap. of Genesis, by the combustion of hydrogen or oxygen, or other combustible gasses, created by the first cause, as stated in page 28 of this work. I have presumed that those gasses were ignited by the electric fluid, by the blaze of comets, or other igneous bodies, and that the extrication of the light and heat, formed by the combustion of these gasses, (in order to produce the formation of the aqueous globe, destined thereafter, to originate the Earth, and the other Planets of our System,) that this light and heat has formed the body of our Sun, which forms the centre of the System, by the laws of His *gravity and attraction.*

If I recollect aright, heat and light have not, as yet, been discovered to have weight ;* but our means of ascertaining this by experience, in the usual way, is very dubious. The bulk of a grain of heat or light may, perhaps, be sufficient to fill a house ; therefore, we could, perhaps, not ascertain the fact ; but heat and light are certainly sensible bodies, and therefore must have weight. Heat expands and increases the dimensions of the hardest bodies in an astonishing

* See Note 2d to 2d Edition, at end of this Work.

manner. Light is said to travel from the Sun at the rate of twelve millions of miles a minute, and also penetrates the most dense substances. Although, therefore, the weight of these subtle agents be infinitely less than any other bodies we know of, they are, probably, subject to the same laws of attraction and gravity.

We may, therefore, conceive that the heat and light extricated from the combustion of these æri-form substances, in the formation of the primordial waters, would unite and ascend, by the laws of their gravity and attraction, or by an original impulse of the Creator,* to their position in the regions of infinite space, and form there the body of our Sun, and that the Planets, as they were formed, and were projected by the projectile force, became subject to its attractive influences.—(*Vide Note* 16.)

Whether this attraction be effected by an inherent power of the Sun, or, that it may be owing in part, to the influence of the vast stream of æri-form substance, passing towards him, to supply him with fuel, I shall presently consider. I shall, however, previously make some remarks in addition to those offered above, on the

* As Light is known to exist in two separate states, namely, latent and active; and as we are told in the 2d verse of Genesis, Darkness was on the face of the deep, it is probable the Light evolved in the combustion of the gasses was diffused through the regions of space in its latent form, and was not elicited into its active and visible state until the time of the 3d verse; and it is remarkable, that the first operation of Deity at the time of the separation was the evolution of Light in its active and visible state, and the collection of it into one vast focus, the Sun of our system, as by the 4th verse. And I am happy to think that, our Theory of the formation of Light by the combustion of the Gasses, will serve to remove a frequent objection to the Mosaic account; namely, the existence of Light, before the Sun is said to be formed in 1st chap. Genesis.

idea of Buffon, of molten glass having formed our earth and the planets of our system.

It is, I consider, impossible to conceive, that glass could exist in the stupendous heat of the Sun's fire, without decomposition, that is, without returning to its elementary principles.

Glass is formed in our planet of siliceous earth and pot-ash. The former we have before proved, on the authority of Linnæus, to be composed by the vegetable process; its parts are, therefore, formed of the gasses which the vegetable extracts from the water and air it imbibes for its nutrition. The latter, pot-ash, has also yielded to Sir H. Davy a metallic button. It is, therefore, an oxyd, and must contain much oxygen. Siliceous earth and pot-ash, the component parts of glass, are then, mostly composed of æriform substance.

We know that the diamond, which is, probably, much more dense than siliceous earth, in other forms, has been volatilized in part by burning lenses, or by streams of oxygen gas in a state of ignition. What can these heats be in comparison to the Sun's fire? perhaps as an atom to a world.

I trust, therefore, it is more consistent with the sacred documents we have had handed down to us by our religion, with the operations of nature we are enabled to examine, with the admirable simplicity and order of the laws, by which the FirstCause has directed the operations of that nature, to believe, that *having first formed the principles, which in the present state of our knowledge, we must call elementary,* He proceeded by the combination of these principles, by combustion, to form the waters which were destined thereafter to produce our EARTH and PLANETS.

It is, indeed, possible, that these elements, OXYGEN, HYDROGEN, and AZOTE, may be compounded of other final elements,of much greater energy than themselves, but the rules of science forbid us to consider *that* as the fact until we have found it by experiment. We have, therefore, only to carry our knowledge of these principles into our reflections on the construction of our system, and with humility, praise and adoration, to conceive, that as most, or all, the geological bodies we have analized, are found to consist of these principles, they may have been those with which, the FIRST CAUSE, with amazing skill and effect, has operated the wonderful system of Creation He hath bestowed on us.

In the contemplation of this Creation, and of the recent discoveries in pneumatic chemistry, I trust to have shown the possibility, that our Sun may have been formed, at the time of the formation of the primordial waters of Genesis ; and as before stated, I have considered the other planets of our system, and their moons, to have been formed in the same manner at the time when, by the creative mandate, the combustion of the gasses took place, and which, I consider, to be meant and recorded by the 1st verse of 1st chap. of Genesis. So I likewise conceive that our Sun, was formed at the same time, by the vast body of heat and light disengaged by the stupendous combustion, and that having found his position in the regions of infinite space, according to the laws of his nature, he exerted his attractive influences on the planets of our system, of which he became the centre.

We have now to consider by what laws the vast waste of the heat and light of the Sun is replenished ;

and, as our conceptions thereon, will be found in some degree at variance with the hitherto received ideas of the nature of the spaces between the Sun and Planets, and the regions of infinite space, and bear also considerably on the nature of the Sun's influence on those planets, we shall first make some observations on the

ATTRACTION OF MATTER.

It is said by philosophers, that all bodies are attracted to the earth's centre : all bodies thrown into the air from the earth, descend to the earth's surface when the propelling force is spent, and when the body is arrested by the atmosphere through which it passes. It is said by Paley, page 449, of his Natural Theology, that " One principle of gravitation causes a stone to drop towards the earth, and the moon to whirl round it. One law of attraction carries all the different planets round the Sun."—This, he says, philosophers demonstrate ; and at page 388, he adds, " Calculations were made some years ago of the mean density of the Earth, by comparing the force of its attraction with the force of the attraction of a rock of granite, the bulk of which could be ascertained, and the upshot of the calculation was, that the Earth, upon an average through its whole sphere, was twice the density of granite, or about five times that of water."

Now, respecting the principle of attraction, I have to remark, that in Chemistry we know with certainty, that particles of matter have a mutual and elective attraction called Affinity. When an acid is united with a metal into a neutral salt by this attraction, it may be

separated from it by any substance with which the acid or its particles have a greater affinity. Thus, if iron, or its oxyds, be dissolved in sulphuric acid, it forms green vitriol, commonly called copperas ; but by adding an alkali to the solution, the iron precipitates, and a neutral salt is formed of the sulphuric acid and the alkali.

In a lake or pond in the isle of Anglesea, in Wales, the water holds blue vitriol or copperas in solution, which is a salt composed of copper and the sulphuric acid.

When iron hoops are thrown into the pond or lake, they become covered with copper scales, which is scraped off, and found to be the purest copper in nature. This decomposition of the blue vitriol takes place because the particles of iron have a greater affinity or elective attraction for the sulphuric acid than the copper has.

The Load Stone is well known to attract iron, even in a cold state. Pieces of iron, rubbed with the Load Stone, become also magnetic : two pieces of wood, or cordage and wood, and probably many other substances, by friction to a great degree, take fire ; that is to say, they become raised to that degree of temperature by that friction, that their particles attract the oxygen from the azotic gas, and from the light and heat with which they are combined in our atmosphere. Certain stones also, as flints, being struck against iron or steel, heat the particles of the steel so as to calcine them ; that is, they bring these particles to the temperature at which they *also* decompose the oxygen gas of the atmosphere, and disengage its latent light and heat.

Thus the attraction of Matter is *certainly* proved by Chemistry.

But how is the attraction of large and solid bodies proved in the usual temperature of the atmosphere, as in the case of the block of granite mentioned by Paley? One rock of granite placed alongside another, will evince no attraction. It is said, indeed, that some islands, having much iron ore, have attracted a vessel from her course, which, if it be the fact, may perhaps also prove the attraction of matter of a certain description, but I know no other way by which the attraction or density of the rock of granite could be proved, but by breaking it by some other body, and ascertaining the weight of the stroke, thus, if a hundred weight of granite required a stroke of a certain number of pounds to break it, and a rock of some other species required only a force of half that number, its attraction or density might be said to be half that of the granite; thus far, then, attraction would be proved by Chemistry and Geology also.

But, that the Creator originally fixed some such law as attraction, for the cohesion of the particles of matter, appears highly reasonable, else, how should the Earth and Planets, travelling at such an immense rate in their orbits, be retained in their present forms, notwithstanding the power of such velocity of motion?

A ball of snow, when impelled by the force of the arm, if it be not rendered sufficiently dense by compressure, separates into innumerable parts, and it must have been the same with the Earth and the Planets but for some law of attraction or cohesion, to re-

sist the attrition of their rapid motion through the heavens.

This attraction, then, of the particles of matter seems to be indispensible to their existence as spheres, but the attraction of these for each other, though generally agreed to by the philosophers, appears more dubious and uncertain.

This doubt is supported by their immense distances ; which may, indeed, be founded on a crude idea, and the doubt may perhaps be dissipated on further consideration.

The Moon is observed in its approach to occasion high risings or tides of the waters of the earth, which recede on its retiring. This, it seems to me, is an almost incontrovertible proof that the atmosphere (for storms are often generated at the same approach of the Moon) and waters of the earth and seas, are attracted by the Moon. If the Moon have this power, we may reasonably conclude that other planets have this power also, governed by certain laws of distance and dimension.

Now, as to the manner in which the Sun exerts its attractive influence on the Earth and the other Planets.

This attraction of the Sun is said,by the philosophers, to be the cause why the Earth and Planets, having been, originally, projected in a right line, do not move in that right line, but in their respective orbits round the Sun.

As to the opinions of these philosophers of the nature of the Sun's substance, I am not aware, except as above stated by Paley, that Buffon supposes it to con-

sist of molten glass. I trust to have shewn in the foregoing pages the improbability of this, and that it is more probable to be a body of Light and Heat. His density, in that case, cannot be equal, bulk for bulk, to the density of the Planets, which are with reason, considered to be inhabited, and must probably be formed of solid matter.—But as to the nature of the Sun's substance, I confess, I cannot conceive it possible that a body of such inconceivable heat, should consist of any thing else than gazeous substance. We know of nothing here below that can produce light and heat with more intensity, than the decomposition of oxygen gas. Why should we not reason by analogy that the light and heat of the Sun are produced by the same means? All the other means we have of producing heat by burning glasses, or by friction, are derived from the Sun, and nothing is more remarkable in nature, in her general principles than uniformity of means. The principle of gravity is said to be the same in an apple falling to the ground, as in the motions of the heavenly bodies.

Is it not then impossible to conceive,that in the Sun's heat, solid or liquid substances, could exist undecomposed. The diamond is volatilized into vapours, and if I recollect right, the perfect metals also, by the galvanic power. It has, indeed, been supposed by some, that the Sun may be habitable, that the heat of the particles of light is owing to their friction or attrition, in their passage to the Planets. By such a supposition, we should be forced to conclude, that the planets farthest off from the Sun, were the most warm, which I imagine, is totally contrary to probability, to the opinions of the greatest philosophers, and to the

evidence of our own senses in the Planet which we inhabit.

Now, but for the idea which has, hitherto, been adopted, that the regions of infinite space, or at least the spaces in which our Sun and Planets move, are in a state of *vacuum ;* but for this idea, I should say, that the Sun is a mass of burning æriform substance, such as hydrogen gas, or some mixture thereof, which has the power of decomposing oxygen gas, and of throwing off its light and heat. The union of the bases of these gasses, oxygen and hydrogen, would form water, in the state of vapour, which would either be directly decomposed again, by the Sun's fire, or otherwise be driven off into the heavens, and probably be in future decomposed, as happens in our atmosphere, by the electric fluid, or be otherwise condensed into aqueous globes, for the future formation of other heavenly bodies.—(*See Note* 12.)

I shall now offer some observations on the above idea of the philosophers, on the existence of a vacuum in the spaces through which the planets move.

If we consider the projectile force to have been *ab origine* given to the Planets by the Creator, we may suppose, that this force was greater than what would have been required to produce their motions round the Sun, if a vacuum had existed, as thus ; allowing the spaces between the Planets and the Sun, to be filled with an æriform substance, of vast tenuity, (and indeed that such immense spaces should consist of vacuum is nearly incredible) yet it would still be possible, that this æriform substance *should not impede* the motions of the Planets ; because, on the above

supposition the projectile force would have been made so much *greater* than would have been required for moving these planets through a *vacuum only*, as the resistance of this æriform substance should render necessary to overcome that resistance by the projectile force.

Again, the force of the attraction of the Sun, allowing its substance to be æriform, and that such immense streams of gasses were continually pouring into it, as would be required to support its combustion, we shall find the force of this attraction (hitherto so called) must be greatly increased ; for, in addition to its own proper attraction, as a body of heat, light and æriform vapour, we shall perhaps find reason to conclude that this attraction must be greatly augmented by the vast streams of æriform substance, continually passing towards the centre of the Sun, for supplying its combustion and repairing the vast waste of the light and heat.

A small fire in a stove is sufficient to draw to it a strong current of air to support its combustion.

The power of currents of air on the earth and seas is well known to upset ships, trees, and houses.

The power of steam, also, will come under the same comparison ; and according to its quantity, will raise almost any weight.

What, then, must be the effect and power of such inconceivable streams of gazeous substance, rushing through the heavens, as must be required to supply fuel for the Sun ? And it appears to me, the power of the Sun to attract the Planets, at such immense dis-

tances, is hereby the more satisfactorily accounted for, as *they* are to be supposed solid spheres, while, as I have presumed, by my Theory of the Sun, *his substance* must be æriform, and of course, of much less density, bulk for bulk, than the Planets. If, then, we should adopt the idea that the heavenly bodies do *not* float in a vacuum, but should accede to the probability, that the intervening spaces are filled up with an æriform fluid for the purpose of supplying fuel to the Sun's fire, I humbly conceive we shall have found a satisfactory way of accounting for the influence of the Moon on our seas and atmosphere. If the fact be certain, that the waters rise as the Moon approaches the Earth, and recede as she retires from it, may not this phenomenon arise from the pressure exerted on the æriform matter above mentioned by the Moon, on its approach to the Earth, which pressure, at length reaching our atmosphere, presses on *it* also, and thereby on the Waters of the Ocean, causing them to rise and fall proportionably, and to occasion the SPRING, NEAP AND DAILY TIDES ?

Should we not,also, have, by the same theory,a plain and simple way of accounting for the great principle of attraction in the heavenly bodies? that, by a power similar to that which propels bodies forward on the earth and seas, or atmosphere, namely, the wind; so the heavenly bodies are propelled from their right line, and driven round their central Sun by this mighty current of æriform gasses in their courses towards the Sun.—(*See Note 6th to 2d Edition at the end of the Book.*)

Allowing the projectile force—(by which I understand Sir Isaac Newton to have meant the primary

projectile force directly given to the heavenly bodies by their Creator)—allowing that force and the attractive force of the Sun, to be the causes of the, nearly, circular motions of the Planets, still it appears to me clear, that this projectile force must be something very different from the species of impelling force which Paley, in his Natural Theology, speaks of in page 390 of that work. "If it were possible," he says, to fire off a cannon ball with the velocity of five miles a second, and the resistance of the air could be taken away, the cannon ball would for ever wheel round the Earth, instead of falling down to it." Now, if the ball were fired off in a direction due north, it is evident that in the course of the circle it would form, it must return by the south pole, to the place it was fired from, to north; and therefore, in every revolution, it would return in an exactly opposite direction to where it was fired off from; the force, therefore, by which it returns, could not be the force of firing off, because it returns in a line directly opposite to that force.—(*See Note* 8.)

I therefore conceive the projectile force, impressed by the first cause on the heavenly bodies, is of an entirely different nature from the projectile force of a cannon ball.

May it not rather be something in the nature of the force of the current of gasses I have mentioned, as forcing the Planets into their rotatory motion round the Sun?

May not the projectile force, partake of the nature of electricity?

Referring to what we have said above, as to the means by which the waste of the Sun's light and heat

is replenished, we shall now make some observations on a very important sentence as to this subject, contained in Paley's Evidences of Natural Religion, page 392.

On the subject of the cause of the attraction of the Planets by the Sun, he there says : " Nor shall we find less difficulty in conceiving a conflux of particles incessantly flowing to a centre, and carrying down all bodies along with it ; that centre being itself in rapid motion through absolute space ; for, by what source is the stream fed, or what becomes of the accumulation ?"

The principal objection of Paley, then, to the idea of a fluid or æriform substance existing in the spaces between the Sun and the Planets, and between each of themselves, is contained in his question, " By what source is the stream fed, or what becomes of the accumulation ?"

If we allow, however, that the Sun is a body in a state of constant combustion, and that its ignition is supported in the same manner as terrestrial fires, (and without allowing this, we cannot, according to our knowledge of combustion, conceive how the fire of the Sun is continued,) we shall meet with no difficulty in finding " by what source the stream is fed."

The spaces between the Sun and Planets, and also the regions of infinite space, if they be allowed to contain æriform fluids, (whether these be oxygen and hydrogen gasses, or a mixture of these, or of other inflammable gasses,) these inconceivable extents of space would certainly contain sufficient fuel to supply, not

only our Sun, but probably all the Suns of the other systems that may exist.

It is, I think, proved above, that resisting *medii* may be contained in the planetary spaces, without retarding the planetary motions. Hydrogen gas, being thirteen times lighter than atmospheric air, and being very combustible, that is, easily uniting with oxygen, and thus setting free its latent heat, and light, may therefore be supposed to form a great proportion of these æriform *medii*.—(*See Note* 12.)

In fact, as we know of no such thing as a vacuum in any part of Nature around us, it seems difficult to conceive that the vast spaces between the heavenly bodies are in that state, and this has no doubt suggested to the ancients the idea of the "*abhorrence of Nature of a vacuum*.—(*See Note 6th, to 2d Edition at end of this Work.*)

By what means, then, a sufficient quantity of this æriform fluid can be found is, I trust, evident, and the question of the Archdeacon, "By what source is the stream fed," is answered. And the end to which the stream is applied, namely, the support of the Sun's waste by combustion, will also answer the other question, "What becomes of the accumulation? I answer, *It is consumed by the Sun's fire.*

If the *medii* then, of the planetary and infinite spaces may be supposed to consist of hydrogen, oxygen, or other inflammable gasses, or a mixture of these, the hydrogen and the oxygen gasses, being drawn into the Sun, would be immediately decomposed, giving out their latent light and heat, and water would be formed

in the state of vapour, which would either be also decomposed by the Sun's fire, or driven off into the heavens by its own elasticity, and there condensed into globes of water, destined thereafter, to form new Planets or Worlds, like those of our own system, and evincing the unceasing tendency of nature, in obedience to laws by which it is endowed by the Creator, to give life and enjoyment to countless myriads of beings; in which novel subject I shall treat in the sequel.—(*See Note* 17.)

If the fact be founded, that the attraction of a Planet is formed by the attraction of its parts, and that therefore the power of its attraction is in proportion to the density of the Planet; then, if we allow the Sun to be a body of æriform matter in combustion, its attraction must be much less, in proportion to its bulk, than the attraction of each of the solid Planets; although its greater bulk may compensate for its inferior density; but, the current of æriform fluids which, to use Paley's words, "would be powerful enough to carry bodies down with great force towards a centre," will it not also account, in whole or in part, for the attraction the Sun exerts on the Planets? As to these fluids being, as he says in an other place, "powerless with respect to the motions which result from the projectile impulse;" I trust I have explained before, that the resisting force of these æriform fluids may have been counteracted by an additional power having been given to the projectile force to overcome that resistance; whereby it has happened, that, as he says again in page 393, "that resistance has had no sensible effect on the Moon's motion for two thousand five hundred years," and, I

may add further, that these fluids *never* can have any such effect; and I trust to explain this more fully hereafter.

We now recur to Paley's observation in page 388 of his Theology of Nature, that "by a comparative calculation with the force of attraction of a rock of granite, the Earth was said to have twice the density of that rock, or about five times that of water."

Has the mode of ascertaining the force of this attraction of the Earth been grounded on the supposed force of the attraction of the Sun on the Earth and Planets? Has the Earth's attraction in the above experiment been come at by calculating its proportionate bulk to that of the Sun, and assigning it therefrom its proportionate attraction? If so, and it should be conceded that the theory I have ventured to propose of the Sun's power of attraction, being created or increased by the streams of æriform fluid passing towards his centre, to supply him with fuel; if this theory be correctly founded in nature, it is evident the above experiment in the attraction of the Earth, cannot be correct in its results. The force of attraction of a body is composed of the united attraction of its parts; but, if the Sun's density have hitherto been considered by philosophers to be according to his powers of attraction, and it should be agreed to, that the streams of æriform fluid have a great influence in producing that attraction, the density of the Sun must, in this case, be much less than it has hitherto been estimated at, and of course the density of the Earth also, if it have been grounded on this supposed density of the Sun.

I now conclude the theory of the Sun's formation by some observations on the following extract from Paley's Work, page 380. Speaking of the intervening spaces between the Planets, he says, " that the intervals between them are made devoid of any inert matter, either fluid or solid, because such an intervening substance would, by its resistance, destroy those very motions which attraction is employed to preserve."

I have before endeavoured to shew, that there may be such æriform substances existing in these spaces, which would, indeed, resist these motions of the Planets, but that this resistance is sufficient only to diminish the velocity of these motions. To explain this more fully,—May not the Moon have been originally projected by the Creating Cause to move in its orbit or course at the rate of three thousand miles an hour ? and, supposing the resistance of the *medii* or æriform fluids of my theory to be equal to one thousand miles per hour, this resistance would only diminish the rate of the Moon's motion to two thousand miles per hour, which is about the actual rate she is said to travel in her course.—(*See Note* 5.)

In fine, the theory of the Sun's being replenished with fuel by means of æriform fluids, is supported by another observation of Paley's. In page 350 of the above work, he says, " The light and heat of the Sun follow the same laws, and, to us, appear nowise different from the light of a candle and the heat of a coal fire." Why, then, may not this heat and light of the Sun be supplied in the same manner as that of the candle and coal fire ?

In our Planet, this heat is now known to be produced by the decomposition of oxygen gas by those combustible bodies, and the consequent extrication of its latent light and heat; but if the light and heat of the Sun be generated by the same laws, and, as there is probably some physical cause for the attraction of the Planets by the Sun; as it is possible his great magnitude would not require less than the spaces between him and the Planets, and between each of them, to supply the æriform fluid for his combustion; and as this amazing current must have a great physical influence on the motion of those Planets round their central Sun, and may, therefore throw additional light on the great principle of his attraction: I, therefore, humbly submit the foregoing Theory of the Sun's Formation, and the means of supplying the waste of his combustion, to the scrutiny of a candid and enlightened world; and being sensible of my incompetence, in respect of that profound degree of scientific knowledge, required in the attempt I have made to reconcile and explain the account of the Creation, handed down to us by our religion, with the great discoveries in the science of Geology, Chemistry, and Pneumatics; I have only to hope, I may, at all events, have exalted the *utility* of these sciences, by shewing their tendency and power to diminish or quiet the doubts of scepticism, and to open greater sources of our admiration of the GOODNESS, POWER, WISDOM, AND GLORY OF THE GREAT FIRST CAUSE.—(*See concluding Note.*)

Having now presented to the public, the Theory of the Sun's Formation, arising, as I conceive, naturally,

from the stupendous quantity of light and heat which must have evolved from the combustion of the gasses required for the formation of the Ocean of Genesis, and having therein given my ideas on the manner in which the waste of the Sun's light and heat may be replenished, I purpose now to make a few observations on the opinion stated by Sir John Herschell as to the opaqueness of the Sun, and also of the spots which are found on, or adjacent to, his surface.

Sharon Turner, in his Sacred History, page 46, vol. 1, says, "Of the actual substance of the Sun, so little "satisfactory to our judgement has been discovered, "that all which is mentioned concerning it, can rank "no higher than conjectures, more or less plausible. "Dr. Herschell thought his Body to be opaque, with "an upper stratum of Black Luminous Clouds. Black "Spots of varying magnitude and form are continually "appearing upon it, and *receding*," and in a Note from La Place, page 20, it is said, "Doctor Her-"schell has inferred, that what he deems the Sun's "Luminous Atmosphere, is 2500 miles from its "surface."

The preface to Sharon Turner's Work, is dated 1832. The first Edition of mine was published in 1836, the above observations as to the substance of the Sun could not, therefore, include it; and I shall now make one final observation in support of the probability of my system, namely, that it is, I conceive, highly probable, the Deity would convert the stupendous quantity of Heat and Light which must have been extricated from the combustion of the gasses (of which the Oceanic Waters are formed) to some great pur-

pose. The fabric of the Sun thereby, was it not the most prominent and necessary one he could have applied it to ?

Now, respecting Dr. Herschell's opinion, as to the opaqueness of the Sun, as I am well aware of the extensive means of observation and of the exalted talents of that Philosopher, and equally conscious of my own want of scientific knowledge, to cope with it, I must leave the decision on the validity of my Theory of the Sun to him and other men of scientific acquirements, should it meet their eye ; and in that case, I beg to submit to them (should they agree to that validity) Two Questions :

1*st Question.*—The Luminous Atmosphere of Sir John Herschell being, as he says, 2500 miles from the Sun, will it not be accounted for by the vast Bodies of Hydrogen and Oxygen gasses which I have supposed, by their combustion, to serve as alimentary Fuel for the Sun ?

Also,—The Spots on the Sun's surface, or (as some say), adjacent thereto, may they not be accounted for by the above said cause ; the denser volume of aqueous vapour which must be produced by this vast combustion of Hydrogen. These combustible gasses would probably be ignited at the distance mentioned, 2500 miles from the Sun, and no doubt, they would prove luminous enough.

2d Question.—If, as it has been lately suggested, our Atmospheric Heat is produced by the Sun's rays operating on an Etherial Medium, can we allow this Heat to be produced by any other means than by abstraction ?

Heat is undoubtedly a Material Substance, and from whence soever it is abstracted by the Sun's rays, (if carried off,) a corresponding degree of cold must it not be produced? and the whole extent of the space between the Earth and Sun must it not become more and more refrigerated, unless some means are found for replenishing this waste of Heat? and this, we humbly conceive, our Theory of the Sun will do.

Having thus concluded my attempt on the system of Creation of our Earth and Planets, and of the formation of their Central Sun; with the means which I conceive may have been adopted by the Creator, to supply the vast waste of his combustion, we now proceed to the last part of our prospectus, namely, the Dissolution of our Globe, with the possible changes, which the present state of our knowledge would lead us to presume, would be the result of that

DISSOLUTION OF OUR EARTH.

By the authority of scripture, we are informed, that the Globe we inhabit is doomed to dissolution by the element of fire. We cannot, indeed, presume to say that the nature of this conflagration shall be the same, and be governed by the same laws, as those which take place at present, but judging from the hitherto immutable nature of those laws, we shall proceed to consider the principal changes which, according to them, would take place at this general conflagration. There are, indeed, many parts in the external and internal phenomena of the earth, which subject it conti-

nually to change and decomposition. The probable effects also, of its continual motion in the heavens, and the possible contact of other heavenly bodies, perhaps igneous, appear to confirm the destiny recorded in the scriptures.

The late discoveries, however,in pneumatic chemistry, have proved to us, that what had hitherto been considered as destruction by fire, is only a *change* or decomposition of the various combustible bodies, into the elements of which they are composed. A great proportion of the vegetable world, is found to be reduced by combustion, into elastic vapour, called gasses; and, it is not improbable, at least, if we assent to the facts stated by, and the opinion of Professor Chaptal, which I have before stated, on the productions of the vegetative process; and also, the still higher authority of Professor Linnæus, quoted above, whereby many of the primary earths and metals are proved to be the products of vegetation: I say, therefore, if we assent to these facts, it is not impossible, that the various earths and metals, and their combinations, may hereafter be found to consist of compounds of the bases of the gasses of oxygen, hydrogen, and azote.

In the foregoing system of Creation, I have stated that lead is found to gain an accession of weight by oxydation of nearly ten pounds in one hundred pounds, by the absorption of oxygen from the atmosphere. This oxygen, must therefore, exist in the oxyd in a solid state. Pit Coal and Pot-ash, are found also to contain oxygen and hydrogen in the same state, and the Schisti or Slate Mountains are also said to have been composed by the decomposition of vegetables, which

are primarily composed of these gasses, and these Schisti therefore, probably, in part consist of solid oxygen, &c. In fine, from these facts, and many others stated in the foregoing pages, we have, in the Theory of Creation come to the conclusion, that the processes of vegetation and of animalization, were the machinery chosen by the First Cause, for the gradual production of all the geological bodies of which our earth is composed.

Now, the marine vegetables of the Waters or Ocean of Genesis, can have imbibed their nourishment from these waters *only*, and must have had the power conferred on their natures, to decompose these waters, and to re-compose by the process of vegetation (as we find to be the case in terrestrial vegetables,) a vast variety of new productions, all of which however dense, must have possessed the constituent elements of water and air, *oxygen* and *hydrogen*, and *Azote*, for their *final* elements.

The depositions then, of the marine vegetable world, having formed a certain, and a very great proportion of the geological bodies of the earth; the remainder of them we have conceived to have been formed by the depositions of the marine animals. The habitations or shells of these, we have shewn in various parts of the foregoing Theory to compose a considerable portion of the earth, and the vast generations of these animals, after their decay and decomposition have, no doubt, according to their affinities and gravities by their depositions, formed or entered into, the structure of the remaining geological products.

In the course of our Theory, we have endeavoured to shew, that the vast Chalk and Lime Stone formations of the earth, may also have been the result of the decomposition or disintegration of these marine shells. On this subject, we have to add one observation ; bearing considerably on our present object, namely, the *final* elements of the geological bodies. It is, that Chalk and Lime Stone, being carbonates of lime, must also, therefore, consist of a great proportion of oxygen in a solid state, their carbonic acid being compounded of oxygen and carbo. Lime itself, also has, if I mistake not, afforded Sir H. Davy a metallic button ; it is therefore an oxyd, and contains oxygen in the same solid state.

Dr. Buckland, in his late Bridgewater Treatise, states, that Lime Stone and some other rocks are in great part composed of the remains of certain fossile animalculæ.

The marine animals, again, of the Waters of Genesis, whether they derived their nutrition directly from those waters, or from the plants contained in them, or both, must finally have been composed of the constituent elements of water, the *only* mode of nutrition of these plants. But it is possible, and even probable, that the marine animals had the power of decomposing the imbibed air of the atmosphere, by which they would obtain another elementary principle, *Azote.* This is an æriform substance, which is always found to be produced by the remains of terrestrial, and, no doubt, marine animals also.

Thus we are led to suppose the final elements of all geological bodies, and of the marine plants and

animals of the ocean, and of the vegetable and animal productions of the earth to have been *ab origine*, OXYGEN, HYDROGEN, AZOTE, HEAT, and, perhaps, LIGHT AND ELECTRICITY; and that the immense variety of proportions of these constitutes the distinctive characters of those bodies.

Now, in the event of the dissolution of the Globe by fire, the consequence would be, (as combustion is now known to be nothing but the extrication of light and heat, or caloric, by the decomposition of the oxygen gas of the atmosphere, and the subsequent absorption of its oxygen by the combustible body,) that the elements of all combustible bodies would enter into new combinations. The waters of the Oceans, if not directly decomposed by this vast combustion, but, merely evaporated into vapour, would probably collect together, be finally condensed into water, be attracted together into vast bodies, and form *Oceanic Globes*, which must obey the laws of gravitation and motion, and would thus form the matrices of future planets.

On the contrary, should the watery vapours of our earth and ocean be drawn into the conflagration at this dissolution, and be decomposed by the intensity of its heat and the contact of the combustible bodies, which is indeed probable, these vapours would thereby be resolved into their primary elements, oxygen and hydrogen, in the state of gasses. A great proportion, also, of the vegetable and animal creation would immediately be decomposed into these gasses and the azotic gas.

The earthy, mineral, and metallic substances of the globe, many of which we have shown in the foregoing pages of our theory, to contain an abundant quantity of these gasses in a solid state, would be partly decomposed into these primary elements, and the remaining more indestructible parts, if not decomposed by the heat of the conflagration, would be resolved by it into vapours, for we have found, as before stated, that even by the comparatively small degrees of heat which the art of man has discovered, the diamond, and some of the perfect metals, have been resolved into *such* vapours ; and, allowing even that these metallic, earthy, or mineral vapours, should not be decomposed into their final elements, even by the heat of the conflagration, they must, after the combustion, be collected into vast bodies, mix with the other gasses resulting from the decompositions above stated, and, probably, by the agency of chemical affinity, find their decomposition effected by these gasses ; or, otherwise, their decomposition into the primary elements of oxygen, hydrogen, and azote, may be finally effected by the *electric fluid.*

Thus, although it may be the design of Providence to put a final period to the present state of existence of our globe ; yet, as the primary elements of which we have conceived it to be composed, are indestructible in the present state at least of our knowledge, these elements must unite to form the materials of a new state of existence ; unless, indeed, counteracted by the divine ordinances, by which these very elements themselves should be annihilated.

Now, that this globe is destined to dissolution is, I have already mentioned, probable, from many facts in its external and internal phenomena.

Its Pit Coal, sulphureous and nitrous combinations and the inflammable and other gasses it produces, and the tendency of these to produce earthquakes and volcanos, may not operate sufficiently deep in the earth to produce its total dissolution. This is, indeed, more likely to arise, from its various motions in the heavens, and the possible contact of igneous bodies, as Comets, &c., and it may form a part of the design of the Creator, that the heavenly bodies should thus be subject to continued changes ; yet, would it not appear consistent with the unceasing evidences we have of His benevolence, to suppose, these changes are *not to destroy* the final elements of His creation ; but to *produce* higher and better states of existence by their instrumentality ?

Assuming, therefore, that the conflagration we are considering, has finally decomposed and resolved by combustion, and the power of mutual affinity, or by the electric fluid, all parts of the earth and oceans, into the primary elements *Oxygen*, *Hydrogen* and *Azote*, or other elements, we have now to consider how these would *recombine* to form other heavenly bodies. These primary elements, having been drawn together by the laws of affinity or attraction, would probably be soon ignited, and brought into combustion by the electric fluid, or the light aud heat of the general conflagration. The hydrogen gas, would then unite with the oxygen of the oxygen gas, whose light and heat or caloric would be set free, and the formation of *watery vapours* would ensue. These condensing in the course

of time, (for it is probable the light and heat of the conflagration would, by laws of its gravity, find its way to the higher regions of infinite space) while these newly formed vapours, condensing in the course of time, would form an oceanic globe, which, also, in obedience to the same laws of gravity and attraction, would he attracted or driven, according to our theory, round its central Sun ; and being endowed by the powerful and benevolent ordination of the First Cause, with the most abundant prolific and plastic powers for the generation of plants and animals ; these would, exactly in the same way (by which, as we have stated in our Theory of Creation,) the waters of Genesis produced our Earth, so the plants and animals of the new aqueous planet, would be continually tending, in the course of sufficient ages, by their vast accumulation, their death, decomposition and depositions, according to their affinities and gravities, they would be thus continually tending to form the solid parts of their globe, which, by the laws of gravity, would be attracted more or less near the centre, and these depositions would thus accumulate, until the land should finally appear on the surface of these waters.

We must then, suppose the same benevolence and power of the Creator would be exerted to bring plants and animals on this part of its creation, endowing them with life and enjoyments of such degrees of eminence in the scale of being, as His providence might be pleased to direct.

Thus, we have cause to believe, from our evidences of the benevolence of the Deity, that the globe we inhabit, if destined to combustion, may be, thereby,

changed into another, and more perfect state of existence, and its inhabitants be gifted with greater blessings; and we shall now venture to draw a conclusion from the foregoing observations on the dissolution and reproduction of the globe; namely, that although we are told in Scripture that this dissolution will take place, and the inhabitants then on the earth will perish, yet as we have stated, that "it would be more consistent with the unceasing evidences we have of the benevolence of the Creator, to suppose these changes are not to *destroy the final elements* of his Creation," and, as we have accordingly supposed these elements will only assume a new state of being, we therefore now draw our conclusion, *that*, as the final elements of the corporeal substance of *man*, could only then in common, with those of other elements, assume a new state of combination; so we conceive that the benevolent Creator (having in the present life given to him these high powers of intellect, and those hopes of a better state of existence,) has also arranged some plan, by which the elements of these bodies, and by a parity of reasoning, the elements of those who shall have died previous to the conflagration; some plan, I say, by which the elements of these bodies shall be re-united to the souls of which they formed the matrices on Earth, and that with them, they shall be endowed with a better and more perfect state of existence, as foretold and promised in the Scriptures.

The elements of those human bodies, must otherwise be left to the disposal of a chance combination, and might thereby, enter into the reproduction of inanimate substance. We cannot conceive this to be part of the design of the source of truth and benevolence;

and we therefore believe, that this *very indestructibility of the laws of nature*, and her eternal tendency to form (as we have attempted to shew above) new combinations of matter, offer a proof, also, of the distinct destined existence, and of the immortality of the *soul of man.*—(*See Note* 6.)

Having now finished these considerations on the Creation, Dissolution, and Reproduction of our Globe, in a new state, I shall only mention, that, reasoning from analogy, we may conceive the other systems of the heavenly bodies, to have been formed by the same laws of nature, instituted by the Omnipotent for that purpose. But we are told by a great poet, "Presume not God to scan," and asI agree with that idea, inasmuch, as that we ought not to venture so to do, beyond the data and facts, which he has placed in our view, so I have limited these observations, to our system; humbly conceiving I have in some measure shewn, that the geology of our globe, and our latest discoveries in pneumatics, will warrant the conclusion I have drawn from the foregoing facts and experiments.

In the Theory of the Sun I observed, that the water formed by the combustion of the hydrogen gas, in supplying him with fuel, might, perhaps, be condensed into globes of water, destined hereafter to form new worlds or planets, like those of our own system, by the means we have detailed in the Theory of Creation.

I have now only to add, that we may well conceive this possible, from the incessant proofs of power, wisdom, and benevolence, we are permitted to discover in the operations of the Creator; that, in fact the recent discoveries of our Astronomers, of Planets never observed before by the vigilance of those of former ages,

may be a proof that new formations of heavenly bodies are always taking place ; and, that as we cannot presume to limit the attributes and power of a First Cause, so the reproductive and plastic powers with which He hath endowed the laws of nature, may be found in continual operation, for the production of other systems of heavenly bodies, and that the Almighty attributes, and energies may be thus continually giving life and enjoyment, in a scale nearly infinite, and advancing, perhaps, incessantly, in displays of His Goodness, Power, Wisdom, and Glory.—(*See the latter part of Note* 17.)

APPENDIX.

The following Notes and Illustrations are recommended to the reader's attention as illustrative of the THEORY OF CREATION, *and particularly as containing observations on the late discoveries in Geology.*

Note 1. It may, perhaps, be thought by some, that allowing the processes of vegetation and animalization in the waters of Genesis, to have produced, by their decomposition, all the materials of the geological productions, yet, that the quantity of deposition required to form the Earth, would be more, than (they conceive,) could be produced by the vegetables and animals of these seas or waters. But, one single fact, which I shall mention from an ingenious publication, "On the *animals and monsters* of our oceans," will, perhaps, satisfy their doubts on this head. It is stated in that publication, "that the offspring of *one single herring*, being suffered to remain unmolested in the sea, for twenty years alone, would produce more than

sufficient to form in bulk, *ten* such globes as we inhabit ;" and if, according to the system I have offered, it be conceded that the design of the Waters of Genesis, was to form and produce the Earth by these depositions, we may reasonably presume, that vegetable and animal life, were abundantly prolific to produce that end. Reckoning a herring to produce 30,000 eggs, the produce of the females, in two generations only, would be 6,750,450,000,000 of herrings.*

Note 2. I here insert some observations on the composition of the granite mass, which is supposed by some geologists, to form the internal parts of the Earth, or frame work of the globe.

This mass is composed of the assemblage, sometimes in thick, sometimes in very thin laminæ of various kinds of mineral substance, such as quartz, mica, feldspar, &c., all of which substances, again, are composed of the various *primary* earths, lime, magnesia, silex, alumine, barytes or terra ponderosa. The granite mass, then, is ultimately compounded of these primary earths, most of which, we have shewn to be produced by the decomposition of vegetables and animals ; and that this mass has been, originally formed in, and deposited from, a fluid, appears to me proved by the chrystals of quartz, minute scales of mica, and its appearance of so fine a granular structure, and more especially by the visible layers and laminæ dispersed throughout that texture. I have counted about twenty layers of a white substance, in a fragment of granite, a foot square.

* The Geometrical Progression of each subsequent generation will be found, by dividing the previous one in half and multiplying that half by 30,000 and then always adding the other half to the amount found.

Now, had the granite mass not been formed by the gradual decay, decomposition, and deposition of marine vegetables and animals, as we have stated in the Theory of Creation; had its materials been formed at once in the Waters of Genesis, the various substances composing it, (the mass) would have united according to their mutual affinities, and been precipitated according to the laws of their gravity, in vast homogenous masses; but the visible depositions of part of it, in layers and laminæ, seems to confirm the opinion of their having been deposited in the course, perhaps, of numerous ages, from the decomposition and depositions of vegetable and animal life. And though we should allow with the Huttonians that the chrystalline appearance of this and other primordial rocks may be produced by the internal fires, yet this will not inform us nor account at all, for the original production of their elementary particles.

Now, although from the more ancient formation of the Granite mass few instances of visible vegetable or animal remains are found in its interior;

Yet, (as we know that water of itself deposits nothing, but what it has held in previous solution, either partial or complete, and, as we know of no other source, from which the substance of this solution could be derived in the Waters of Genesis, but from vegetable and animal decomposition, and as we have seen, by the foregoing theory and data, that vegetable and animal decomposition affords the materials of which the granite mass is composed.) I trust, we are warranted in the conclusion, that having been deposited, and lain many ages previous to the deposition of the secondary and tertiary strata, and *that*, in a state

of moisture, all its vegetable and animal organization has been destroyed from that cause, and those of compression, internal heats, and the electric fires of the Earth ; and that this granite mass, has been produced by the same means, which appear to have been chosen by the Creator, for the construction of the more external parts of the globe, namely, the generation, decay, death, decomposition, and deposition of the vegetables and Animals of the Waters of Genesis.—(*See Note 5th to 2nd Edition at end of the Work.*)

Accordingly we find in the review of the third Edition of Lyell's principles of Geology, it is stated, that " the experiments of Watt prove that a rock need not be perfectly melted, in order that a re-arrangement of its component particles should take place, and a more chrystalline structure ensue. We may easily suppose, therefore, [says Mr. Lyell,] " that *all traces of shells* " *and other organic remains* may be destroyed, and " that new chemical combinations may arise, and ac- "cording to these views, gneiss and mica schisti, may be " nothing more than micaceous and argillaceous stones " altered by heat,and certainly, in their mode of stratifi- " cation and lamination they correspond most exactly. " Granular quartz, may have been derived from silice- " ous sand stone, compact quartz from the same. Clay " slate may be altered shale, and shale appears to be " clay, subjected to great pressure. Granular marble has " probably originated in the form of ordinary lime- " stone, having, in many instances, been *replete with* " *shells and corals now obliterated*, while calcareous " sands and marles have been changed into impure chry- " stalline lime stones."

I have, chiefly, made the above extract from Mr. Lyell's work, in answer to the objection stated in the preface of my Theory, made by Mr. Fairholme, regarding the granite mass; and I trust, it will prove, that although, this granite mass contains at present no organic remains; yet, it may have contained them originally, and that they may have been destroyed by the heats, fires and consequent change or fusion, the mass has undergone from those, or, perhaps, from electricity. In fine, I must here repeat, I find no cause, after the perusal of the latest works on geology, to vary from the Theory of Creation, I now venture to present. On the contrary, I find several of the German Geologists have adopted the same opinion, namely, "that vegetable and animal life have been the cause of the production of the solid portion of the Earth."

I therefore, must adhere to the opinion I have stated, in the 11th Note, that the discoveries of the marine organic remains, will be satisfactorily explained by this Theory, and the necessity precluded of supposing the Earth more ancient, since the separation of the waters, than by the Mosaic account; and I now conclude this note, with an observation from Sharon Turner's "Sacred History of the World." Therefore, [he says,] it appears to me most probable, that whenever the *right theory* of the fabrication of the Earth, and the era and succession of its organized beings, shall be discovered, it will be found to be compatible with the Mosaic cosmogony, in its most natural signification."

Happy should I be, if the theory I am now presenting to the world, should, in its estimation, be found to approximate to this description.

The late discoveries in geology of Baron Cuvier, Lyell, and Buckland and others, as they comprise not more than one mile of the depth of the Earth, (being no more than an 8000th part of its diameter) do not in the least invalidate the theory I have formed, which comprises the entire of that diameter. I, however, repeat and extend here, the observations I have made already in these Notes.

First, that Baron Cuvier, in his computation of the distance of time, namely, 5 or 6,000 years, (at which he places the date of his revolution as the result,) does not state by what comparison or scale he arrived at his decision; and it is difficult to conceive any scale he *could* have had, except a known quantity or depth of deposition from rivers or lakes, in a given time. If this, however, be the source on which he has founded his computation, I cannot but consider it a very insufficient one. The power of deposition of lakes or rivers could no more be compared to the quantum of that power, possessed by the waters of a deluge, or by the primeval oceans, than the currents of those rivers or lakes could be, to the almost, inconceivable force of the waters of a deluge overwhelming a great part of the earth.

I should therefore humbly suggest the query, whether the period at which these fossil deposits of the bones of terrestrial animals may not ascend higher than the time of the Deluge of Noah, and the circumstance of no human bones being found in the

particular place of these discoveries, has been owing to those parts not being then, inhabited by our species.

Or, secondly, allowing him to be correct as to the period of 5 or 6000 years, at which he dates his revolution, and which, as he says, "has buried and caused to disappear the countries formerly inhabited by man, and the species of animals now most known, that, contrariwise, it has left the bottom of the former sea dry, and has formed on it the countries now inhabited." I would ask, is not this period, which agrees very nearly with the time of the separation of the Mosaic account, equally well accounted for by *that* separation, and, therefore, instead of the countries formerly inhabited "by man having been then buried and caused to disappear," shall we not rather say, that the Earth was *then separated from the seas* in which it had, according to our Theory of Creation, been formed, and that soon after this period of the separation, *Man was created.*

This Theory will also equally account for the present appearance of those marine deposits and organic remains now found at the greatest depths of the Earth to which mankind have yet penetrated. All these marine exuviæ and organic remains, and the strata under which they are deposited, are satisfactorily accounted for by the construction of the 1st verse of Genesis we have formed as the basis of the Theory of the foregoing treatise; and which construction has since been sanctioned by the eminent Geologists and writers already specified.

I have only to add some observations on the Review of Lyell's Principles of Geology, of April 1835, on the subject of the antiquity of Mount Etna. "It is thus," it is said, "that volcanic formations confirm the evidence afforded by the sedimentary strata of the immense antiquity and lengthened duration of even the most recent geological æras." But is it not probable that the eruptions of Etna were much more frequent for ages after the time of its first eruption than what they have been since? Is it not probable the causes which produced that first eruption have since been greatly diminished by the numerous flowings of lava; according to the force of the cause, so must have been the number and frequency of those eruptions, and their frequency at first cannot be estimated by the eruptions which have happened in our times. The age of this mountain may, therefore, be very far less than a computation formed on the frequency or deposits of its late eruptions would make it. The eruptions, also, may have begun for ages before it emerged from the waters of Genesis, and these sub-aqueous eruptions been deposited before the separation of those waters.

Note 3. It remains now to offer some observations on the Salt formations of the Earth.

These formations offer strong evidence of our Theory of the waters of Genesis. This salt, occasionally called common salt, sea salt, or marine salt, is entirely a creature of the ocean: no terrestrial vegetable that I know of has ever produced it, except when growing nigh the salt water.

These vast formations, found in various parts of the Earth, must have unquestionably originated, from saline

waters ; and one way, in which the separation of the salt from the water which held it in solution, may be accounted for is, that parts of these seas have been swallowed up by earthquakes or volcanos, and their water exsiccated by internal fires ; or, that these parts of the seas have, by some revolution, been separated, and not being replenished by any rivers, have been gradually dried up by the Sun.

But, I should suppose the quantity of salt produced by these accidental causes, would not, nigh, amount to the vast salt formations of our Earth. Some intentional operation of Providence for their production is most likely to have been the cause of the production of an article so indispensible for the use of man ; and, I therefore conceive, it is more probable these formations have derived their origin from vast depositions of the marine plants of the waters of Genesis. These must have contained this salt in abundance, as do the marine plants of our seas ; and the other products of their decomposition have united, according to their affinities, to form other Geological bodies.

These marine plants must have contained Sodium, and the Marine Acid to form the sea salt, has probably been produced by the decomposition of sea water, as hydrogen is said to be the basis of that acid. Sodium has the property of decomposing water, and according to Good, in his Book of Nature, " the gills of fish have it also." Or, if we adopt the analysis of sea salt by Sir H. Davy, the chlorine, (being entirely a produce of the Ocean,) has entered into combination with the Sodium to form the chloride of it.

Note 4. It seems, indeed, almost impossible (supposing for a moment the idea of Buffon were founded as to the origin of our earth,) to conjecture, by what means its waters could have been subsequently obtained. A body of molten glass would, necessarily, assume a spherical form in the heavens ; and it seems not probable or possible that such vast cavities as the beds of the seas or oceans could have been formed on it by its motions.

Again, vitreous substances do not contain the elements that produce earthquakes and volcanos. Hydrogen or inflammable gas is probably required for that effect, which is not contained in glass ; therefore, the vast cavities of the ocean could not arise from internal commotions ; but, even allowing them to have been produced by some unknown cause, how is the origin of the waters to be come at ? Water is, I believe, sometimes generated in our atmosphere by the combustion of hydrogen ; but this is a mere drop in the ocean compared to the general cause that produces our rains. In fact, it could not, consistently with the safety of the productions of the Earth, or even that of their embryos at the time of their formation, have been made a general law for the purpose of producing the waters of the oceans.

On the other hand, the system of the formation of the earth, from waters generated by combustion, appears to be a more natural and satisfactory solution of the phenomena of creation.

The waters formed and endowed, as we must conceive, according to the design of the Creator, with the most prolific powers of generating plants and animals,

produced gradually sufficient deposits to form the Earth.

I have stated in *Note* 1, that a single herring, unmolested for twenty years, would, as it has been computed, produce *ten* of our Globes; and, allowing it to produce only one Globe, what must the depositions of all the vegetables and animals of the waters of Genesis amount to? In fact, on a consideration of the probable powers of deposition of these waters, and of the small proportion the known parts of the land bears to our oceans, we might be inclined to conjecture that there may be vast tracts of land on the Globe yet undiscovered.

Note 5. It may be observed further respecting this resistance of the æriform medii of our Theory, that, as our system itself, and I believe also the fixed stars, are allowed by Astronomers to have some progressive motion, and which must be owing to the principle of attraction towards some centre; therefore, the resisting æriform medii must move the same way also in their courses towards the Sun, having thus two motions; they must be thus attracted towards the same centre as our system is said to be; the resistance they give to the Earth and Planets in their rectilineal motion, though it may thereby diminish the velocity of that motion, yet it cannot "destroy it," these æriform medii being themselves under the influence of the same attraction towards an unknown centre.—(See Note 8 in confirmation of this.)

This idea of a general motion of our system, and of the fixed Stars, will be found in the work I have so often quoted, "Paley's Natural Theology." He states,

if I rightly remember, " that the fixed Stars have certainly small motions," and considers them to be attracted to a centre ; and if this be really founded in fact, it certainly offers one of the grandest ideas of the Deity the mind of man can conceive, namely, that if all the Systems of the Heavenly Bodies thus move round one common unknown centre, may we not conceive *that* centre to be the *Empyreal Throne of God* mentioned in the 4th chapter of Revelations, from whence He beholds continually, the immense operations of His hands, performing their revolutions round Him?

The above idea of universal attraction also offers another very important one, of the cause of the Projectile Force or rectilineal motion of the Planets of our system, namely, that this universal attraction to a common centre IS that cause ?

Since writing this Note I have seen the substance of the second paragraph of this Note confirmed by the eloquent discourses of Dr. Chalmers, lately published, on the Christian Revelation in connection with the Modern Astronomy.

Note 6. The reasoning in this work, in pages 76 and 77, is grounded on the idea, that the entire substance of man, including the soul, is not destined to perish with the material substances of the globe. On that idea I have supposed, that the corporeal parts of his frame, may be, by some arrangement of the Deity, reunited with the soul or intelligent part ; but should the future state of existence be one altogether *spiritual*, the constituent elements of the body, may then, perhaps, enter into indiscriminate combinations with other matter ;

all I wish to infer from the reasoning offered on this subject is, that the intelligent spirit or soul of man is *indestructible.*

Note 7. I wish, now, to call the reader's attention to the ingenious and profound researches of Mr. Cuvier in Geology. It appears that as the result of these researches, he comes to the conclusion, " that if anything be proved by the geology of the Earth, it is, that a great revolution took place on it from 5 to 6,000 years ago," antecedent too, to the existence of man on those parts at least, of the Earth, for he is said to have proved, that no vestige or organic remains of the human species have ever been discovered, among the remains of the other animals found among the strata or deposits he treats of.

The period at which he states, this revolution to have taken place, agrees very nearly with the scriptural account of the separation of the waters. We know, therefore, that man did not *then* exist. We have, in concurrence of the opinion of this great revolution, Plato's account of his Atalanta, supposed to be the extent now covered by the Atlantic ocean, which, according to Plato's opinion, was formerly dry land.

That it is possible such revolutions may have taken place since the Creation, is not to be doubted. The oceans may, in the course of time, have worn away those boundaries that have prevented their overflowing extensive tracts of the Earth, or the power of earthquakes, or volcanic fire may have produced a disruption and carried away the barriers of the ocean. It is, however, to be observed, that it is singular

this opinion of Cuvier's is not supported by any account in the scriptures. Had such a great convulsion taken place soon after the Creation, is it not probable some oral tradition would have reached the time of Moses, or other scriptural writers, just as we have handed down to us the account of the deluge of Noah?

It were to be wished, therefore, this eminent Geologist had turned his attention to the waters of Genesis; as, I cannot but think, he would have therein found a more plain and easy solution of the phenomena he has so ably developed. The one mile of strata containing the remains on which he treats would, probably, have been deposited by these waters in a very limited period, previous to the separation of those waters of Genesis, which would satisfactorily account for the non-appearance of any organic remains of the human species in these strata, because, it had not at that period been yet created, and it would equally well account for those fossil and organic remains of the marine animals he had found in those strata, and the vast period of time, namely, millions of years, he and the other late geologists conceive these strata have required for formation, would be also accounted for.

In fine, there is good and powerful reason to believe the account of Creation must have been delivered to Moses by divine inspiration. It is not likely, that he of his own ideas, or even from any traditionary account could, in those times, have possessed that extension of thought, that would have enabled him to frame such a system, or to form the conception that the Earth was produced in a globe of water.

That it has been so formed, has not been discovered by science until the present day, nigh 6,000 years after its separation from those waters ; and as I have said in the body of this work, we have no historical account of *any but* the waters of Genesis, to which we can refer the phenomena of the Earth, so I trust to have proved, that the best discoveries in geology and pneumatics are calculated to shew the real and necessary existence of those waters, and to add new forces to the authenticity and authority of the holy scriptures.

It is, moreover, to be observed, that Cuvier gives us no scale, by which he has decided on the time of this revolution to have been 5 or 6,000 years ; and it is very difficult to conceive what data he *could* have. The time taken by rivers or lakes to form deposits of a known thickness would avail him nothing, as their power of deposition could not be compared to that of a deluge. May it not, therefore, be possible that the revolution he refers to, may have been that of the deluge of Noah in parts of the Earth not inhabited by the human species ?

Note 8. It is said, indeed, by philosophers, that a body once put in motion, if all the resistance to it were taken away, that the body would continue to move in its course for ever ; that is a case, however, which never can be proved by actual experiment, and it must rest solely on the opinion or arguments of those philosophers.

If, however, the above supposition of perpetual motion of bodies moving in a vacuum be founded in nature, and that the heavenly bodies are made to move

in a vacuum, to obtain the object of perpetual motion; we may, in addition to what we have observed in Note 5, on the subject of universal attraction to an unknown centre, remark, that this universal attraction, (supposing our theory of the regions of space being filled with æriform medii to be correct) may be the cause which prevents the diminution of the projectile force in the courses of those heavenly bodies through those æriform medii.

Note 9. It is true, that only some of the earths and none of the metals have yet been decomposed, and are therefore considered as simple substances. Carbo, however, which would appear to be the chief *solidifying principle* of the vegetative process, is well known to be susceptible of receiving the gazeous state by combination with oxygen into carbonic acid gas. If any method should ever be discovered of separating the oxygen from this carbonic acid gas, the carbo would be found again in its solid state. Chlorine gas also, when united with hydrogen by congelation, is found by a late discovery to assume the solid state, in the shape of chrystals more than one inch long. This modern experiment is of great importance, as it proves that two gazeous bodies can, by their combination, form a solid one.

As I have often repeated, also, in the body of this work, and in these Notes, all the metallic oxyds and several of the earths and alkalies must contain a great quantity of oxygen in a *solid* state.

The most dense nature of bodies, therefore, is no proof that they may not be composed of æriform substance, and a vast and most important field of dis-

covery is, probably, yet reserved for pneumatic chemistry, namely, the separation of the gasses from the caloric, and the light which retains them in that form, and the obtaining *their bases in the solid state.* As a proof of the vast importance of *such a discovery*, we now suggest, that the nutritive parts of the vegetable and animal kingdom must be composed (if our theory in the foregoing work be well founded,) of the solid bases of those gasses ; the discovery, therefore, of obtaining these bases separate from their heat and light, may possibly offer a mode of forming *nutritive matter* not yet known to mankind.

Note 10. Thus, by our construction of the 1st verse of Genesis, it would appear that the present actual state of the geological bodies, their frequent chrystalization and their gradual depositions in strata and laminæ, can be reconciled to the scriptural account. That chrystalization and these strata and laminæ must according to the evidence of our senses, have required numerous ages for their formation and deposition. By the supposition that the time of the 1st verse was antecedent to the six days of the separation, the time required for these depositions is obtained, and they are satisfactorily accounted for ; and also their having the appearance of *gradual* deposition which they present to us. As it would appear, therefore, that the Creator has formed the Earth by these natural laws we find every every where established, we shall now with humility suggest, that the true meaning of the 4th commandment is, that in six days the Lord *prepared* the Earth, for the use of its inhabitants.

Note 11. Having just now obtained a sight of the late publication of Lord Brougham of last year, 1835, I here subjoin an extract from it, describing the late discoveries of Fossil remains by Cuvier, Buckland and other Geologists, to which I add some observations bearing on the relation of these facts to our theory of creation. In page 33 of his work, Lord Brougham observes, " the discoveries already made in this branch of science, (Geology) are truly wonderful, and they proceed on the strictest rules of induction. It is shewn, that animals formerly existed on the globe, being unknown varieties of species still known; but it also appears that species existed, and even genera wholly unknown, for the last five thousand years. These peopled the Earth as it was, not only before the general Deluge, but before some convulsion, long prior to that event, had overwhelmed the countries then dry, and raised others from the bottom of the sea. In these curious enquiries, we are conversant, not merely with the world before the Flood, but with a world which, before the Flood, was covered with water; and which in far earlier ages, had been the habitation of birds and beasts and reptiles. We are carried as it were, several worlds back, and we reach a period, when all was water and slime and mud, and the waste without either *man or plants*, gave resting place to enormous beasts like Lions and Elephants, and River Horses, while the water was tenanted by Lizards, the size of a whale, sixty or seventy feet long, and by others, with huge eyes, having shields of solid bone to protect them, and glaring from a neck ten feet in length; and the air was darkened by flying reptiles. covered with scales, opening like the jaws of the crocodile, and expanding

wings, armed at the tips with the claws of the Leopard. No less strange, and yet not less proceeding from induction, are the discoveries made respecting the former state of the earth; the manner in which these animals, whether of known or unknown tribes, occupied it; and the period when, or at least the way in which they ceased to exist.—Professor Buckland has demonstrated the identity with the Hyenas', of the animals habits that cracked the bones which fill some of the caves, in order to come at the marrow; and he has also satisfactorily shewn, that it inhabited the neighbourhood, and must have been suddenly exterminated by drowning. His researches have been conducted by experiments with living animals, as well as by observations on the fossil remains."

I have now to observe; it is to be regretted that the geographical position of these discoveries is not mentioned by his Lordship. If they had been found in the vicinity of the countries inhabited before the Flood, by Noah or his ancestors, it is singular that no oral or written tradition is given (at least that I am aware of) by Noah or his decendants, of this convulsion before the Flood. "We reach a period," says his Lordship, "when all was water and slime and mud, and the waste, without either man or plants gave resting place to enormous beasts, &c." If this period of time, therefore, is to be supposed as having been between the Creation and the Flood, it must probably have taken place in a part of the world very remote from the country inhabited by Adam or his descendants, before the Flood, and if there were, as is stated, "no plants" growing in these resting places for these "enormous beasts like Lions and Elephants and River Horses," whence did these ani-

mals get their subsistence? If no subsistence were prepared for them in these resting places in the land, is it not probable these "enormous beasts" may have been marine or amphibious? I must, therefore, say, that the circumstance of their being no tradition handed down to us by Noah or his descendants, of so great an event as this convulsion, coupled with the fact, admitted by the Geologists who have narrated these discoveries, that "no plants" are found to have existed in these "resting places, for the nutriment of these enormous beasts;" (for allowing them to be animals of prey, the animals they devoured must have had means of sustenance from the productions of the earth,) therefore these two circumstances, of no tradition of this convulsion and "no plants," would seem to warrant the opinion that these skeletons or organic remains, were those of marine animals which had been deposited at their death more or less below the present surface of the earth from the waters of Genesis, (according to our Theory of Creation,) before the time of the separation of the waters, as recorded in the first chapter and ninth verse of Genesis, when God said, "let the waters under the Heavens be gathered to gather into one place, and let the dry land appear; and it was so."

As to the flying serpents, by the account itself, they appear to have been marine inhabitants of the waters; and for the same reason that applies to the "enormous beasts" that "no plants" have been found in those resting places; so the "birds" mentioned in the above account must, probably, have been marine or aquatic also, and have existed as above

stated before the separation of the waters at the 6 days of the creation.

There are, therefore, three facts taken from the statements and discoveries of Dr. Buckland and the other modern Geologists, which come in support of the idea mentioned above, that the " organic remains were those of marine animals which had been deposited at their death more or less below the present surface of the Earth, from the waters of Genesis, before the time of the separation of the waters, as there recorded.

The first fact is, that we have no other tradition from Noah or his descendants of this great convulsion of Nature, which is said by these Geologists to have taken place before the Flood.

The second fact is, that by the accounts of these Geologists, no organic remains of the body of man have been found with those of other animals.

The third fact is, that no remains of any plants have been found among those other remains.

On the first fact we shall observe, that it is remarkable the time stated by Cuvier that this " convulsion" took place, agrees very nearly with the time of the separation of the land from the waters recorded in Genesis, namely, between 5 and 6000 years ago. The effects of this convulsion of the Geologists we may suppose to have been general over the greatest part of the Earth ; therefore, had it taken place since the Creation, is it not equally probable so great an event would have been handed down to us by tradition, as that of the universal

Deluge has been? On this fact I have further to observe, that if we consider this convulsion to have taken place previous to, or rather at the time of the separation of the waters, we shall probably find it much more easily accounted for, because the 9th verse of 1st chap. of Genesis says, " And God said, Let the Waters under the Heavens be gathered together unto one place, and let the Dry Land appear; and it was so."

Now, the effects of the Deluge in the time of Noah are, I believe, generally allowed to have made great changes on the face of the Earth. The effects even of common inundations which have taken place and been recorded in history, have also had the same visible effects. Is it not therefore probable that the effects of the mighty rush of waters from, over, and all round the Earth at the time of the separation, must have had a corresponding greater effect, and produced the convulsion described by the Geologists? and is not this effect the more likely, from the circumstance that the land must, at this period, have been in a soft and humid state, probably for a considerable depth below its surface?

On the second fact I observe, that the circumstance of no organic remains of the human species being discovered among the other fossil remains, will be completely accounted for by supposing, as above said, that the " convulsion took place at the time of the separation of the waters of Genesis," since Man was not *as yet* created.

The third fact, " that no remains of plants have been found," appears to me almost confirmative of the above

suppositions, that these organic remains were produced before the separation, and deposited from the waters of Genesis; since, had this convulsion happened since that separation, and these organic remains been in existence on the land, there must have been plants growing for their nourishment; and moreover, it is stated by Dr. Buckland, in his account of these remains (as may be seen in the Quarterly Review of April, 1836,) that the far greater part of the organic fossil remains of the secondary formations are *marine*. The remains of terrestrial quadrupeds or other terrestrial species have of course been formed since the separation. I cannot, therefore, but be of opinion, that the geological facts described by the modern Geologists, at least as respects marine remains, will be more satisfactorily explained by the theory we have endeavoured to establish inthe foregoing treatise. That the necessity of supposing that the Earth, since the separation, is more ancient than is stated by the Mosaic account, will be thus avoided, and that this Mosaic account can be thus maintained in its integrity; and I am glad to observe that Dr. Buckland has acceded to our construction of the 1st verse of Genesis, adopted by Dr. Pusey and others, as will be seen by the extract in the preface to this work.

To conclude, whether this great convulsion of nature were really one that took place since the Creation, and produced the overflow of an extent of country formerly inhabited by the animals above described, and which has since then become dry land again; whether, I say, such a convulsion has taken place since the Creation or not, it does not at all effect the validity of

the Theory of Creation which is now offered to the world; for this theory embraces the *primeval formation of the entire circumference and diameter of the Earth*, and is therefore *antecedent to any partial* convulsion that may have, since that formation, taken place.

I now conclude this Note with a few observations in support of the formation of the Geological bodies in the primeval oceans, drawn from the depositions of matter and consequent formations of land which must be continually taking place in our present seas.

In the space of two or three miles in the harbor of Halifax, N. S., I have seen thousands of cart loads of kelp or sea weed collected from the shore in a season, and it is probably thrown up in the same quantities all along the coast of America.

In Scotland, great quantities are burnt to extract its saline matter; as also in Spain and Portugal. What must be the quantity therefore, that annually decays and and is deposited at the bottom of the ocean. In addition to this are the immense formations of coral beds: (See end of Note 4th, pages 88 and 89,) the still more immense depositions of shells, and different animals of the seas. These depositions are probably conglomerated by the sand and earthy particles brought down by the rivers and abraded from coasts by the tides and storms. These masses must be continually augmenting, and in due course of time will probably greatly augment the proportion of land. The waters of our oceans and seas (for a vast quantity is constantly consumed in the nourishment of the marine plants) must, on the other hand, be continually diminishing; and although, if I recollect aright, Dr. Paley

states in his " Evidences of Natural Religion," that all the evaporations return by the rains ; I think it is easy to prove that not to be the case, for an immense proportion of the rains is consumed in the nourishment of terrestrial vegetables and by animal life : a large proportion of vapour is also dissolved by the air, and probably decomposed by the electric fluid into its gasses. This continual increase of land and diminution of the waters of the Earth, must it not, in the course of sufficient ages, greatly alter its specific gravity ? What effect this may have on the Earth's relative attraction with the other heavenly bodies, I leave to Astronomers to determine. But it is, I conceive, possible, that a change in the degree of its attraction may be the means by which the dissolution foretold in the Scriptures may be ultimately brought to pass ; and it may be also possible that the design of a Benevolent Creator, in making the proportion of water so much greater than the land, has been, to retard this dissolution for numerous ages.

If, therefore, our present seas do continually tend to the formation of land by the decay and deposition of their productions ; if the natural effects of the laws of nature have led me to form a just conception that the Creator may have chosen the means stated in the foregoing theory by which to form our Earth, we may be certain those means were made competent to that end, and it is therefore probable, vegetable and animal life were diffused in far greater abundance in these primeval waters than in our present oceans.

The processes of vegetation and of animalization, therefore, we have assumed from the facts and geological appearances stated in the foregoing work to have been the means or machinery employed by the Creator

in the "beginning" to produce the land of our Earth, and by analogy the land in the other planets of our system. They have probably been thus produced and continued for a long period, in a soft and humid state, and numerous changes and decompositions have since taken place in them by the effects of the internal heats and fires they have generated. To these causes, perhaps, may be imputed the earthquakes, volcanos, and disruptions which have produced such inequalities in the surface,and to these internal fires I conceive it may also be ascribed, that the oldest of these rocks have no appearance of stratification nor organic remains, they have probably lost the stratified state by the effects of those fires, or by the power of the electric fluid.

Note 12. It may, perhaps, be objected to the idea of hydrogen, or other inflammable gasses, existing in the regions between the planets, to serve as fuel for the Sun's waste of light and heat, that such inflammable gasses, would, by taking fire from the electric fluid, endanger the safety of these planets.

It is, however, I believe, allowed, that electricity pervades through all nature, and a vast quantity of hydrogen gas must be constantly exhaling in the decomposition of vegetables and animals; yet, no such effect is produced. In fact, lightning is never produced that I am aware of, in our atmosphere, but from clouds. Moisture seems, therefore. indispensible for that end, and the hydrogen gas, being thirteen times lighter than common air, must ascend far above the atmosphere.

Note 13. By the experiments of celebrated chemists, and more particularly by the authority of Linnæus, we trust to have proved a considerable number of the primary earths and metals to have been formed by the vegetative process of terrestrial vegetables. But, conceiving, according to the theory in the foregoing treatise, that it was the design of the Creator to produce the geological bodies by the instrumentality of the processes of vegetable and animal life, decay, death, and deposition, we may conceive also, that the marine vegetables of the universal waters of genesis were endowed with much more various and abundant powers for the production of the geological bodies than we have even found in the terrestrial vegetables. This superior power of production would be necessary to produce the design intended, and the same remark will apply to the marine animals of those waters.—(*See the last paragraph of Note* 4.)*

Note 14. The substances Iodine, Brome, and above all, Silicon, lately discovered, will probably ere long throw much light on the productive powers of marine substances by combustion. Iodine, at the heat of 212 becomes a violet-coloured gas. It forms an active acid by uniting to hydrogen. Brome is a dense liquid, and forms an orange-coloured gas by a gentle heat.

Silicon is procured from Silica, or the earth of flints, by the action of potassium : it appears as a dark faun-coloured powder, which is *inflammable*, and which

* It is also to be observed, that the animals of the Primeval Ocean were never taken out of it by the hands of men as is done by our fisheries; which must have greatly increased their accumulation.

produces Silica or the " sandy principle," by combustion. This Silicon has been in a part of this work proved the offspring of the vegetative process. It *decomposes water and acids.* And here, therefore, we have some insight into the means by which Nature has produced all the sands of the Earth and the rocks composed of *siliceous* matter, namely, by the union of the Silicon with the oxygen of the decomposed water, probably after the decomposition of the vegetable matter containing that Silicon.

Sodium, also, a metal lately discovered by Sir H. Davy, is obtained from Soda, the basis of common sea salt. This is, therefore, entirely a marine production. The Sodium is stated by Sir Humphrey to be so very combustible, that when thrown upon water it swims on its surface, hisses violently, and dissolves ; and that Silica, or earth of flints, probably contains two proportions of oxygen and one of Silicon.

As a further proof of the production of siliceous earth, by the process of vegetation, we insert the following extract from Sir Humphrey Davy's admirable lectures on agricultural chemistry; in page 54, he says on the epidermis of plants, " in the reeds, grasses, canes, and the plants having hollow stalks, it is of great use and is exceeding strong, and in the microscope seems composed of a kind of glassy net work, which is principally *siliceous earth*, and in the rattan the epidermis contains a sufficient quantity of flint to give light when struck by steel, or two pieces rubbed together produce sparks." It is known, also, that the silicified seeds of the chara, a plant which grows at

the bottom of lakes, abound in the flints of Aurillac in France.

In Evans's Agriculture, printed at Montreal, it is said, page 51, " The ashes of stalks of wheat gathered " a month before the flowering, and having some of " the radical leaves withered, contained 12 parts of " Silica and 65 of Alkaline salts in 100 parts. At the " period of the wheat flowering, and when most of the " leaves were withered, the ashes contained 32 parts " of Silica and only 54 of Alkaline salts." Thus, at one period the straw contains 12 parts, and at another 32 parts Silica, and this, just at the time the plant is coming to its full growth. Now, if this Silica had been taken up from the soil by the roots of the plant, it would be absorbed by them in the same quantity at all times, and equally diffused through the straw; but if as by our theory the vital functions of the vegetable form the Earths just as they require them, the above most singular fact will be thereby accounted for.

Thus it appears that the latest discoveries of the celebrated chemist Sir Humphrey Davy, confirm the existence of the siliceous earth in vegetables. In fine, having had an opportunity of perusing the best and most modern works on the geology of our Earth, I must here state that they serve to confirm my opinion stated in the theory of this work, that the processes of vegetation and animalization in the waters of Genesis, or universal ocean, are the most highly, natural, and reasonable means, by which we can account for the original formation of the geological bodies; and that these having at that origin been deposited in horizontal strata, have in part, since been subjected to innumerable convulsions, elevations, and disruptions by the effects

of internal fires, or the electric power, and consequently to great chemical changes in their component parts is beyond a doubt, and which the present appearance of almost every part of the crust of the earth confirms. It is, therefore, probable, that a vast number of the rocks, metallic and mineral geological bodies may be combinations of the principles of vegetable and animal life deposited, as stated in our theory, which combinations have been effected by the internal fires or heats of the internal parts of the Earth, and the joint action of chemical affinities. In fine, the vegetable and animal kingdoms are already discovered by analysis to be reducible to the elementary principles oxygen, hydrogen, carbon, azote, and perhaps heat and electricity ; and I think it probable, the mineral kingdom will, ere long, exhibit the same result. For who would have believed fifty years since, that from Silica or the earth of flints, a combustible substance would be procured, reproducing silica or the sandy principle by its combustion, and consequent union with oxygen ? and in fact, all the primary earths are now found to be oxyds containing oxygen as a component principle in a solid state.

Note 15. It is true that Sir H. Davy states in page 12 of his lecture on Agricultural Chemistry, that the result of Van Helmont's experiment was shewn to be fallacious ; but that the true use of water was unknown till 1785, when Mr. Cavendish made the discovery, that it was a compound of two elastic gasses, inflammable gas or hydrogen, and vital gas or oxygen.

Now, although Van Helmont was ignorant of this discovery, the fact he proved is still maintained, that water is the great source of nourishment of plants. In vain would any of the modern discoveries be brought forth to invalidate this great fact, since the vegetation of every part of the earth demonstrates it. In the thickest and largest forests, in the aboriginal woods of the Earth, no sensible diminution of the soil is observable, though under the operation of so vast a vegetation ; whence then can the products of it be obtained but from the surrounding elements of water and air ?

In fact, Sir Humphrey allows in page 211 of same work, that " when pure water only, is absorbed by the roots of plants, the fluid, in passing into the leaves,will probably have greater power to absorb carbonic acid gas from the atmosphere ; when the water is saturated with carbonic acid gas, some of this substance may be given off by the leaves, but a part of it likewise is always decomposed, which has been proved by the experiments of M. Sennebier."

Now, Carbo, appears to be the great *solidifying principle* of vegetables. The other principles are found to be ozygen, hydrogen, and azote, all of which are obtainable by the vegetative process from water and the atmosphere. Accordingly in p. 259 of the same work, Sir Humphrey states, " It is evident, from the analysis of woody fibre, by M. M. Gray Lussac and Thenard, (which shows that it consists principally of the elements of *water* and *carbon*, the carbon in larger quantities than in the other vegetable compounds) that any process, &c." Again he says, in page 211, " Many plants that grow upon rocks or soils, contain-

ing no carbonic matter, can only be supposed to acquire their *charcoal* from the carbonic acid gas of the atmosphere ; and the leaf may be considered at the same time, as an organ of absorption, and an orgain in which the sap may undergo different chemical changes."

I shall here extract from the same work part of page 281, relating to the formation of the principles of vegetables by the vegetative process. M. Schrader and Mr. Braconnot, from a series of distinct investigations, have arrived at the same conclusions. They state, " that different seed sown in fine sand, sulphur, and metallic oxydes, and supplied only *with atmospheric air and water*, produced healthy plants, which, by analysis, yielded various earthy and saline matters, which either were not contained in the seeds, or the material in which they grew, or which were contained in much smaller quantities in the seed ; and hence they conclude, they must have been formed from air or water, in consequence of the *agencies of the living organs*, of the plant." These experiments are therefore confirmative of that stated in the work, performed by Van Helmont on the willow.

In page 282, Sir Humphrey gives an experiment he made with oats to ascertain whether any siliceous earth would be formed in the process of vegetation, but he adds, " the oats grew very feebly, and began to be yellow before any flowers formed ; that the entire plants were burnt and their ashes compared with those from an equal weight of grains of oats ; less siliceous earth was given by the plants than by the grains, but their ashes yielded much more carbonate of lime. That *there was less* siliceous earth, I attribute to the

circumstance of the husk of the oat being thrown off in germination, and this is the part which most abounds in silicon."

Thus it appears by his own experiment, *some* silicon was actually obtained by the vegetative process from the air and the water; and had the growth of the oats in his experiment come to perfection, the quantity would probably have been much greater. Moreover, in page 162, he allows that plants consume very small portions of earth; whence then can the trees of woods and forests derive their growth but from water and air? —(*See Note 1st to 2nd Edition.*)

Note 17. I have here to observe, the opinion I had formed and stated, in the Theory of the Sun's Formation, of an æriform fluid or medium existing in the regions of space, has now been confirmed by the discovery of Encke's Comet.

It appears the Newtonians had asserted, "that either there was no such fluid, or that it was so thin and rarefied, that no phenomenon yet examined by philosophers was capable of betraying its effects." Vide page 151, Whewell's Bridgewater Treatise, 1833, and same page it is said, "But the facts which have led Astronomers to the conviction that such a resisting medium really exists are certain circumstances occurring in the motion of a body revolving round the Sun, which is now usually called Encke's Comet."

It appears this body was first seen in 1786, and that the effect of the resistance of the ethereal medium, from its first discovery, (in that year to the present time, say 1833) has been to diminish the

time of revolution by about two days; and the Comet is ten days in advance of the place which it would have reached, if there had been no resistance. (*See page* 154 *of Whewell's Bridgewater Treatise.*)

It will be seen in my Theory of the Sun, that it was on the idea I had formed of the existence of the æriform fluids, oxygen and hydrogen, in the regions of space, I had founded the mode by which I conceived the Sun's waste was replenished; and I have certainly reason to congratulate myself on the idea of the resisting medium being now confirmed by this singular discovery of Encke's Comet.

The Nebular hypothesis also appears to me to confirm or support both the theory of the combustion of the gasses which I have ventured to produce as the origin of the Earth and Planets, and also the cause and formation of new heavenly bodies by the products of the combustion of the gasses for the replenishment of the Sun's waste of light and heat, as stated in page 57 of this work.

This Nebular hypothesis is thus introduced by Mr. Whewell in his Bridgewater Treatise of 1833, page 143.

"La Place conjectures, that in the original condition of the solar system, the Sun revolved upon his axis, surrounded by an atmosphere, which, in virtue of an excessive heat, extended far beyond the orbits of all the Planets, the Planets as yet having no existence. The heat gradually diminished, and as the solar atmosphere contracted by cooling, the rapidity of its rotation increased by the laws of rotatory motion, and an exterior zone of vapour was detached from the rest, the

central attraction being no longer able to overcome the increased centrifugal force. This zone of vapour might in some cases retain its form as we see it in Saturn's ring, but more usually the ring of vapour would break into several masses, and then would generally coalesce into one mass, which would revolve about the Sun. Such portions of the solar atmosphere abandoned successively at different periods would form 'Planets in the state of vapour.'

Now, it does not appear that La Place has given any clue to find how or of what this solar atmosphere and vapours were formed. He does, indeed, support the idea, that Planets may be formed by vapour and subsequent condensation, which is precisely the way the oceanic globe of our theory is conceived to have been produced; And without infringing on the humility we wish to preserve, we may say we have presented to his consideration a real and competent cause for the production of the atmosphere and vapours of his ingenious hypothesis.

The combustion of the gasses, of which we all now know water to be formed, as stated in p. 24 of this work, and the extrication of their heat and light, will they not only account for this solar atmosphere, but also the means by which the Great First Cause produced the Sun himself?

CONCLUDING NOTE.

In the contemplation of the wonderful discoveries in pneumatic chemistry, of the gasseous bodies, and peculiarly so of the component principles of water, I have conceived the formation of the waters of Genesis to have been produced from these elementary principles, by the creating cause at "the beginning;" but have, in the foregoing treatise abstained, for reasons stated at the end of page 77, from carrying my speculations onward to the other systems of the heavenly bodies, further than reasoning from analogy, that they *may* have been formed by the same laws. In this Note, however, in conclusion of this work, I propose to offer some observations on this subject, as a comment on the 6th and 7th verses of 1st of Genesis. "And God said let there be a firmament in the midst *of the waters*, and let it divide the waters from the waters; and God made the firmament and divided the waters which *were* under the firmament from the waters which *were* above the firmament, and it was so."

Sharon Turner, in page 30, "Sacred History of the World," and other Writers, consider the firmament to refer, and to mean solely, the atmosphere. Now this extends only forty-five miles above the earth. But, a column of vapour of a given breadth of 45 miles high, does not probably, exceed a column of equal breadth of water half a mile deep, in respect to the relative quantities of water each column contains. Our oceans are generally said to be 4 miles deep, and the 6th verse says, "Let there be a firmament in the *midst* of the waters," which even in our oceans would be two miles deep. But the 7th verse will make it

clear the word " Firmament" cannot refer to our atmosphere. " And God made the firmament and divided the waters which were under the firmament from the *waters* which were *above the firmament*, and it was so." Thus, it is evident, that, in either sense of the word, an Ocean of waters is here stated to exist *above the Atmosphere.* And as it is very remarkeble that no part of the 1st chapter of Genesis gives any direct account of the formation of our Atmosphere, we may, perhaps, conclude, that it was formed in the " beginning" when " God created the Heavens and the Earth" as per 1st verse ; and this is the more probable, that we know one ingredient of of our atmosphere then existed, namely, oxygen, used in the combustion for the formation of the Oceanic Waters of Genesis, and that Air would, probably, be required for the animals thereof, during the formation of our Earth in those Waters.

These verses, therefore, lead us to believe that a Universal Ocean of waters exists over and under the the heavens. If, therefore, our Theory of the primary formation of our Earth and Planets in this globe of water, be founded in the laws of nature, may we not conceive, that the Planets of the other systems of the *universe* have also been, or will be, formed in this universal ocean by the same laws ? If the appearance of the geology of the earth have led us to believe that at the time of the separation, when the solid parts of it had been duly formed, they were, in obedience to the divine command, (probably by the instrumentality of the law of their superior gravity,) then separated from this universal ocean, attracting such parts of it as were within the sphere of attraction of these solid parts,

for the formation of its seas and oceans; that the other Planets of our system have been formed and evolved in the same manner, and, that these Planets, then receiving from the Creator their projectile force, became immediately subject to their motions round their central Sun, may we not, by analogy, also, conceive, that the planets of the other systems have been, or will be formed by the same laws? The Suns of these systems or Stars, as they are commonly called, must indeed, have existed from the "beginning", of the 1st verse, at the time of the Creation of the waters of the Universal Ocean, by the combustion of the elementary gasses of their composition. Very few of the Planets of these systems have, I believe, been yet discovered. This may be owing to their immense distance; but may it not also arise from their not being yet duly formed, and evolved from the waters of this Universal Ocean? and does not the almost annual discovery of new heavenly bodies warrant the supposition?

With due humility, therefore, I venture to call the attention of philosophical divines and men of science, to the more extensive and profound contemplation of the Universal Ocean recorded in the 6th and 7th verses of the 1st chapter of Genesis. The late discoveries in Geology and Pneumatics, in application to this subject, appeal strongly to this contemplation. The unity of the laws of Providence, would almost, compel us to believe, that all the Planetary systems have, or will be formed in the same manner; and carrying with us the highest degrees of our knowledge of these laws into the contemplation of the works of the Creator, we may, perhaps, find that it will afford us an insight into His Power, Wisdom, and Glory, far more stupendous than mankind have yet conceived.

NOTES TO SECOND EDITION.

Note 1. In corroboration of our Notes to 1st Edition, numbers 14 and 15, on the power of the vegetative functions to produce the Primary Earths, we have now to add a statement from Sharon Turner. In his "Sacred History of the World," vol. 1st, page 93, he says, "Vegetables have even some relation with the "Mineral Kingdom; for they not only form the Car-"bon they contain, but some have been found "to have Copper particles," (and in a Note it "is said) "That Copper exists in a great num-"ber of Vegetables, was announced in 1817. Mr. "Targeau found 5 millogrames of Copper in a killo-"grame of gray quinquina, 8 in Martinico coffee, and "nearly 8 in Wheat." (Bull. Univ. pa. 139.) He continues, "And several vegetables secrete Flint and "and likewise Sulphur, as in our common corn," (and in a Note it is said) "Sulphur exists in combi-"nation with different bases in Wheat, Barley, Rye, "Oats, Maize, Millet and Rice." (Lindsay's Nat. Bot. pa. 303.) Mr. Turner continues "We may add "Iron and Gold also, for both of these have been found "in Vegetables."

And in page 393, in a Note it is said, "The ener-"gy and even creative agency of the living principle "of plants appears in its power of converting material

" particles into other substances. Experiments on ve-
" getables seem to prove that the solid matter which
" entered into their composition in the more advanced
" period of their growth, must, in part at least, have
" been produced *by some action of the vital powers*
" and could not have been obtained ab. extra."—Bul. Physic, pa. 307, and Dr. Thompson's Ch.

Note 2. Since publishing the 1st Edition of this Work, I have found that Doctor Thompson, in his Chemistry, says " We are certain that no particle of light weighs more than the million millionth part of a grain."—Chemistry, vol 1st, pr. 300.

Note 3. Doctor Chalmers, in his Natural Theology published in 1836, page 250, says, " We shall advert once more to the Mosaic account of the Creation, more especially as the reconciliation of this History with the definite antiquity of the Globe, seems not impossible, and that, without the infliction of any violence on the literalities of the record. He then narrates the two first verses of 1st of Genesis, and adds, " Now, let it be supposed that the Work of the first day, in the Mosaic account, begins with the " Spirit of God moving on the face of the Waters." The detailed History of Creation, in the 1st chapter of Genesis, begins with the middle of the second verse, and what precedes might be understood as an introductory sentence, by which we are most appositely told that God created all things at first, and that afterwards, at what interval of time is not specified, the Earth lapsed into a Chaos, from the darkness and disorder of which the present system of economy was made to arise. By this hypothesis, neither the 1st verse nor the first half of the second, forms any

part of the narration of the first day's operation, the whole forming a preparatory sentence disclosing to us the initial act of Creation, at some remote and undefined period, and the chaotic state of the World at the commencement of those successive Acts of Creative Power, by which out of rude and undigested materials the present harmony of Nature was ushered into being. Between the initial Act and the details of Genesis, the world, for aught we know, might have been the theatre of many revolutions, the traces of which Geology may yet investigate, and to which, in fact, she has constantly appealed, as the vestiges of so many successive Continents which have now passed away. The whole speculation has offered a vain triumph to Infidelity, seeing first, that the historical evidence of Scripture is quite untouched by this pretended discovery of science, and that even should it turn out to be a substantial discovery, they do not come into collision with the narrative of Moses. Should, in particular, the explanation we now offer be sustained, this would permit an indefinite scope to the conjectures of Geology, and without undue liberty to the 1st chapter of Genesis."

Thus, Doctor Chalmers has confirmed, in the year 1836, the explanation of the 1st verse of Genesis, we had, as stated above, formed in 1825. But, with his idea of the Earth lapsing into a Chaos we do not at all agree; on the contrary, there is strong reason to believe, that from "the beginning" the undeviating design was carrying on, of the formation of the solid parts of the Earth in the Waters of Genesis, as stated in our theory; and this, the 9th verse shews, for the Earth having been duly formed by the continued depositions of the Waters, it was separated from them as per that verse.

Note 4. In further confirmation of the construction we have put upon the 1st verse of Genesis, it will be found, that the Revd. Dr. Adam Clarke, in his commentaries on the Scriptures, says, in commenting on this verse, " that the true translation of it from the Hebrew is " In the beginning God created " *the elements or substance*" to form the Heavens and the Earth."

Yet it is to be observed, that a great part of mankind have, perhaps, received the erroneous idea from their infancy, " that the world was made out of nothing." Now, Doctor Chalmers, in a late publication of his, on Astronomy, says, " that no part of the Scriptures asserts that the world was made out of nothing." Modern science has proved that most of the liquids and solids of the vegetable and animal kingdom are formed, in great part, of gazeous bodies, and the very clays and and sands we walk on, which were formerly considered mere earths, have been proved by Sir Humphrey Davy's experiments in Galvanism, to consist, in great part, of oxygen, which must be combined with the bases of these earths in a solid state.

But for the origin of the elementary gasses, of whose composition or origin we are yet ignorant, we must refer to a Creating Cause.

Note 5. In the Edinburgh Review of Buckland's Bridgewater Treatise, the following extract appears from that work. " It is marvellous that mankind have gone on for so many centuries in ignorance of the fact, which is now fully proved, that no small part of the present surface of the Earth is derived from the remains of animals that constituted the population of ancient

seas. Many extensive plains and massive mountains form as it were the great Charnel House of preceding generations, in which the petrified exuviæ of extinct races of vegetables and animals are piled up, into stupendous monuments of life and death, during almost immeasurable periods of past time.

Mr. Ehrenberg, an eminent Naturalist has since Dr. Buckland's Treatise, discovered by the Microscope, the existence of fossil animalculæ or infusiorial organic remains, which form extensive strata of Tripoli or Poleschiefer (Polishing Slate) at Franzenbad in Bohemia. The animals belong to the genus Baccelaria and inhabit siliceous shells, the accumulation of which form the strata of polishing slate. The size of one of these Animalculæ is the 3000th part of an inch. Yet notwithstanding the conviction which Dr. Buckland so forcibly expresses, of the vast profusion of vegetable and animal life which must have existed in the ancient seas, and which could be no other than the Waters or Ocean of Genesis, as the Doctor agrees to, by the extract from the Bridgewater Treatise, (See page 5 to our preface to 1st Edition) yet, notwithstanding this, he gives an opinion, in another part of that Treatise, that animal life did not exist, previous to the formation of those strata of the Earth where their remains are first found ; namely, the transition or secondary formations. In Note 2nd, to our first Edition, pa. 76, we have given Mr. Lyall's opinion " that all traces of shells and other organic remains, may be destroyed in rocks, by a heat not amounting to fusion." If our system of the formation of the solid parts of our Globe, by the primeval deposition of vegetable and animal remains, be approved ; it will perhaps, shew, that internal heats and fires

generated by the gasses & metals of these remains, were probably, much more frequent in those early periods of the world, than at present. It is, therefore, no proof that vegetable and animal life did not exist prior to the Transition Formations and during the Primary, *to say*, that their organic remains are not found there : an immensely less heat than that which must have been occasioned by the subterranean fires of the Earth, previous to, the separation of Genesis, would be sufficient to destroy all traces of organic remains, and produce a chrystalline structure, and new chemical combinations, as we find them at the present day. This objection, then, to the pre-existence of animal and vegetable life because no present remains are found in the Primary strata, is not, in my opinion, tenable. Now, a great argument of the modern Geologists, is " that the causes at present in operation, must have been producing the same effects in preceding ages." Therefore, by a parity of reasoning, we infer, that, conceiving the design of the Creator to have been, to produce the whole circumference and diameter of our Globe, by the instrumentality of those natural causes and laws which we now see, every where, in operation ; we therefore, I say, infer that the races of vegetable and animal life were continually employed for that end, since the formation of the primeval ocean of Genesis, as stated in our system ; and, that these races were competent thereto, the present power of formation of a large tract of the earth by even a few species of Marine Insects, evidently proves ; and it also proves, that the Deity could not have chosen, from among the laws of nature he had created, so energetic an agent of production, since even electricity, though

much more sudden and violent in its effects, has not the continuity of the agencies of life. The Coral Insect alone, has produced, as shewn in this work, an extent of land equal in length to one eighth the diameter of our Globe, and still continues its operations ; and it is even the opinion of some Geologists, that another Continent will, in time, be formed, in these seas by the means of these Insects.

Doctor Buckland allows that some Geologists are of opinion that fossil remains may have existed in the Primary formations, and all traces of them may have been obliterated by the Internal Fires ; but he appears himself to think, (and gives a quotation, I believe, from another writer,) that the incandescence of the Earth was, during the Primary formations so great, that no animals could have existed in the ocean.

Now, if our Theory be well founded, that the same mighty energy of formation which has produced so large a part of the crust of the Earth, (namely, the labours of the Marine animals during life, and their depositions and those of the Marine vegetables after death ;) if we allow that the same most powerful cause may have produced all the formations of the Earth through its entire diameter, the incandescence during the Primary formations, will not render this Theory untenable. By it, we account for the production of the internal Fires, by the ignition of the inflammable gasses and the metallic bases resulting from the decomposition of the vegetable and animal remains that had been deposited in the Oceanic Waters, and attracted to a centre by the laws of gravity and pressure.

When a sufficient thickness of mass of these remains was thus accumulated, these internal Fires would then

be generated by the ignition of the inflammable matter of their remains, and during the existence of these Volcanic Fires an incandescence might have been produced over a great part of the Earth, which, for a time, would destroy the animals of the Ocean near it ; but as these Fires could last only, until the inflammable matter that generated them was consumed ; when that took place, the (then) crust of the Earth would be cooled down by the waters of the ocean, and future depositions of remains would take place until again collected in sufficient thickness to reproduce internal fires and incandescence ; when the same refrigeration must, in time, have taken place, all the fuel of these fires being again consumed.

In fact, this incandescence may, perhaps, account for a geological phenomenon stated hy Geologists, that entire genera of Marine animals appear to have existed at certain depths and have disappeared in subsequent strata, when other genera and species have succeeded them. May this not have happened by the sudden destruction of these genera by the incandescence, and the reproduction or reappearance of other genera when the refrigeration as above described, had taken place ?

But further, if Doctor Buckland assents to the entire account of Creation, contained in the 1st chapter of Genesis, which he may well do after agreeing that its first verse will account for all the wonders lately discovered by Geology ; in this case it will be seen that in our concluding Note, page 114 and 115, we have shewn that by the 7th verse, the Waters of Genesis existed *above* the Firmament, even allowing this word

to mean the Atmosphere, as thought by some writers.

In this Universal Ocean, by our theory, we conceive the earth and planets to have been formed; and we know from the 9th verse, the earth and its oceans were separated from these waters at the six days of the Mosaic account. This Universal Ocean must, therefore, have been of, perhaps, illimitable extent, and it is not possible that the incandescence of one, or even all the Planets could have more than casually, and for a time, (as we have attempted to explain) prevented the depositions and construction of the Primary formations by he Vegetable and animal kingdoms of this Universal Ocean. Heat always tends to an equilibrium, Water is a great conductor of heat, and the waters of this Universal Ocean would be continually flowing over the Earth, then forming in it, until that equilibrium and consequent refrigeration was effected.

Note 6. In Good's Book of Nature, page 61, it is said, "To shew, says Sir Isaac Newton, "on gravity," that I do not take gravity to be an essential pro- "perty of matter. I have added one question concern- "ing its cause, choosing to propose it by way of ques- "tion, because I am not yet satisfied about it, for want "of experiments." In this question he suggests "the "existence of an etherial and elastic medium pervad- "ing all space, and supports his supposition by strong "argument, and consequently, much apparent confi- "dence, deduced from the mediums or gasses as they "are now called, of light and heat and magnetism, res- "pecting all which, from their extreme subtility, we "can only reason concerning their properties. This "elastic medium he conceives to be much rarer within

" the dense bodies of the Sun, the Stars, the Planets
" and Comets than in the more empty celestial spaces
" between them, and to grow more and more dense
" as it recedes from the celestial bodies to still greater
" distance, by which means all of them in his opinion
" are forced towards each other by the excess of an
" elastic pressure. It is possible, undoubtedly to account
" for the effects of gravitation by an etherial medium
" thus constituted, provided, (as it is also necessary to
" suppose), that the corpuscles of such a medium, are
" repelled by bodies of common matter, with a force
" decreasing like other repulsive forces, simply as the
" distances increase. Its density, under these circum-
" stances, would be every where such as to produce
" the semblance of attraction. The hypothesis, in con-
" nection with the existence of a repulsive force in
" common matter, has a great advantage in point of
" simplicity, and may perhaps hereafter be capable of
" proof. But at present it can only be regarded, and
" was, at first only offered, as an hypothesis."—
(*Good's Book of Nature.*)

It is with great satisfaction I am enabled to present the reader of this 2nd Edition of my work with the above opinion of Sir Isaac Newton, so favorable to our Theory of the means by which the waste of the Sun's light and heat may be replenished. The opinion of this great man is " a host within itself," and is the more grateful to me, that this part of my theory (the possible existence of gazeous bodies in the regions of infinite space, was the part I was most doubtful of,) and I now trust our theory having this sanction, may be submitted to the knowledge and judgment of scientific men with greater probability of their approving it.

Note 7. In the Montreal Herald, of Sept. 13th, 1838, the following notice appeared :—" Encke's Co-" met begins to be talked of. This Comet which com-" pletes its revolution in 1200 days, will be visible in " the ensuing autumn. It will be in its Perihelion or " part of its orbit nearest the Sun on the 15th Decr. ; " about the same period it will be nearest the Earth. " It is (says Mr. Arrago) a vast Nebulosity, 64,000 " times larger in volume than the Earth ; yet, such is " the tenuity of its substance, that in 1795, Sir Wm. " Herschell was able to discover through its mass, a " Star of the 20th magnitude. It must be an *embryo* " *Planet, not yet reduced from vapor to a liquid* " *globose volume, afterwards to be converted into* " *an Ocean and Earth, and organic formations.*"

Here then, is a complete confirmation (as far as the opinion and judgement of Mr. Arrago will go with men of science) of the theory of the possible formation of our ocean, earth, and organic formations which we have in this work ventured to present to the world. Mr. Arrago is, I believe, one of the leading Astronomers of the present day ; and perhaps I may be permitted to suggest to him, that this Comet may have been formed in its present state, by the combustion of the oxygen and hydrogen gasses, for the replenishment of the Sun's waste of heat and light, as explained in our Theory of the Sun's formation.

Note 8. In Sharon Turner's " Sacred History," vol. 1st, page 169, in a Note, it is said, " Linnæus " has only three kinds of Marine plants, *fuci*, *centenas* " and *ulves*. But Lamoreux, has shewn, that theyhave " several natural families : he proves that the Hydro-

" phytes have a more complicated Anatomy than has
" been known. He divides them into six families.
" Lamoreux has remarked, that the Basin of the At-
" lantic to 40 degrees north has a marked vegetation;
" so has the West Sea of the Indies, comprising the
" Gulph of Mexico, likewise the vast coast of South
" America, the Indian Ocean and its Gulfs, and the
" shores of New Holland. The Mediterranean has
" also a vegetation peculiar to itself, and extending to
" the Black Sea."—Bull. Univers. 1800, page 102.

Note 9. The Right Honble. and Revd. Francis Henry Earl of Bridgewater, died in the month of Feby. 1829, and by his last will and testament he directed certain Trustees to invest in the Public Funds the sum of eight thousand pounds sterling, to be held at the disposal of the President of the Royal Society of London, to be paid to the person or persons nominated by him. The Testator further directed, that the person or persons selected by the said President, should be appointed to write, print, and publish 1000 copies of a Work on the Wisdom and Goodness of God, as manifested in the Creation. There were eight Treatises on various subjects. The Revd. Doctor Buckland was appointed to write the Bridgewater Treatise on Geology.

TABLE OF GEOLOGICAL FORMATIONS IN THE ORDER OF THEIR SUPERPOSITION. BY M. AL. DE HUMBOLDT.

Tertiary formations.

- Alluvial deposits.
- Limestone formation, with millstone (meulieres.)
- Sandstone and sand of Fontainbleau.
- Gypsum with bones. Siliceous Limestone.
- Coarse Limestone. (Clay of London.)
- Tertiary sandstone, with lignites (brown coal.)
- Plastic clay. Molasse. Nagleflnhe.

Secondary formations.

- Chalk, { white / soft [tuffeau] / chloritic. } — *Ananchites*
- Green Sand. Wead clay. Ferruginous sand. — Secondary limestone with *lignites*
- *Ammonites. Planulites.* Limestone of Jura. — Slaty beds with fish and crnstacea.
- Quadersandstein, or white sand stone sometimes above the lias. — Coral. rag. Dive clay. Oolites and Caen Limestone.
- Muschelkalk. *Ammonites nodosus.* — Marlyor calcareous lias with *gryphæa arcuata*
- Marls with fibrous gypsum Arenacious layers. — Saliferous variegated sand stone.
- Product. aculeat. Magnesian limestone. Zechstein. — (Alpine limestone.)
- Coppery slate.

Intermediary formations.

- Quartziferous porphyry. — Co-ordinate formations of porphyry, red sand stone, and Coal.
- *Transition formations.* Slates with Lydian stone, greywacke, diorites, euphotides, Limestone with *orthoceratites, trilobites, and evomphalites*

Primitive formations.

- *Primitive formations.* Clayey slates (Thonschiefer) Mica slates. Gneiss. Granites.

A GLOSSARY OF TERMS

IN THIS WORK.

Alumine, pure earth of clay.
Azote and Azotic Gas, a constituent principle of our atmosphere, destructive to combustion and to animal life. (*Vide page* 27.)
Appetencies, a supposed aptness of matter to assume ertainn forms.
Affinity, that particular attraction which Chemists observe different bodies have for each other.
Æriform Fluids, gasses or fluids resembling common air.

Caloric, matter of heat pervading all bodies.
Carbonic Acid, the acid of charcoal formed by burning it in the open air. It escapes in an æriform state.
Chaotic Mixture, a solution of all the solid substances of the Globe, supposed by the ancients to have existed.

Fossil Remains, of animals or vegetables, found in the Earth.

Galvanic power, a species of electricity.
Geology, the Science of the various substances forming the interior and the crust of the Earth.
Gravity or Attraction, that power in matter by which in continually tends to gravitate towards other bodies, according to the laws of its density and distance.

Hydrogen, a constituent element of all water, it is called also inflammable air or gas, and is the same that is now used for lighting cities and inflating balloons.

Laminæ, the appearance of many rocks in the Earth resembling the leaves of a book.

Matrix, the womb of material or spiritual substance.

Orbits, the paths of the Moons round their Planets and of the Planets round their Sun.

Oxygen Gas, a constituent element of our atmosphere, supporting combustion and life in the highest degree. It is, also, a constituent element of water. (*Vide page 27 of this Work.*)

Planets, the heavenly bodies composing our system and revolving round the Sun.

Pneumatic Chemistry or Pneumatics, the Science of æriform bodies.

Silex, siliceous or sandy principle.

Silicon, the metallic basis of siliceous Earth, or Sand.

Sodium, a metal lately discovered by Sir H. Davy, to be the basis of Soda, produced by Marine Plants.

Sulphuric Acid, common Oil of Vitriol.

Tertiary Strata, in Geology the Strata or Rocky formations of the Earth as far as man has penetrated, are divided into three, the Primary being the lowest—Secondary being next—Tertiary being the uppermost.

Vacuum, a space void of matter of any kind, now known not to exist. (*Vide Note* 17, *page* 111.)

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